



Analysis of the RECLAMATION FORFEITURE FUND

Oversight by the
Reclamation Forfeiture Fund Advisory Board

Maintained by the
Ohio Department of Natural Resources
Division of Mineral Resources Management

Issued June 26, 2019



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Commitment Beyond Numbers



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June 26, 2019

Mr. Michael Sliva
Chair – Ohio Reclamation Forfeiture Fund Advisory Board
2045 Morse Road, Building H-3
Columbus, Ohio 43229-6693

RE: Actuarial Analysis of the Ohio Reclamation Forfeiture Fund – June 2019 Report

Dear Chairman Sliva:

Attached is our report documenting our analysis of the financial soundness of Ohio's Reclamation Forfeiture Fund (Fund). This report represents the combined efforts contributed by the Ohio Reclamation Forfeiture Fund Advisory Board, the Ohio Department of Natural Resources – Division of Mineral Resources Management (ODNR-DMRM), and Pinnacle Actuarial Resources, Inc.

This final report replaces and supersedes the draft report issued on June 10, 2019. We have not made any modifications to the expenditure and fund balance indications subsequent to the aforementioned draft report.

As we state in our report, we believe the Fund currently meets the criteria for long term solvency to cover expected liabilities and expenses. This is not to say that the current Fund balance is adequate to cover catastrophic events, such as taking on the liabilities resulting from the failure of one of the largest operators in the state, but it can cover the reasonably expected liabilities. Additional details are contained in our report.

The undersigned author of this report is a member in good standing of the Casualty Actuarial Society and the American Academy of Actuaries, and meets the qualification standards to render the actuarial opinion contained herein.

It has been a pleasure working with you on this study. Please feel free to contact me should you have any questions.

Best regards,



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PURPOSE

Pinnacle Actuarial Resources, Inc. (Pinnacle) has been retained by the Reclamation Forfeiture Fund Advisory Board of the State of Ohio (the Advisory Board or RFFAB) to review the Reclamation Forfeiture Fund's (Fund's) financial soundness.

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QUALIFICATION TO PROVIDE ACTUARIAL REPORT

This report is provided to the Advisory Board by Arthur R. Randolph II, FCAS, MAAA, CPCU, ARM, ARe. Mr. Randolph is a member in good standing of the American Academy of Actuaries and meets its qualification standards to prepare this report.

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DISTRIBUTION AND USE

This report and conclusions contained herein are being provided to the RFFAB for its use in connection with our actuarial analysis of the current and estimated future Fund's liability in comparison with the current and estimated future assets. This report has been prepared to support the Advisory Board in complying with the Ohio legislation which established the Advisory Board as the oversight organization with respect to the Fund. The legislation also required a report be made to the Governor of the State of Ohio by the Advisory Board on a biennial basis.

We understand that copies of this report may be provided to the state auditors and other regulatory authorities along with other parties in compliance with Ohio's open records policies. Permission is hereby granted for this distribution on the condition that the entire report, including all exhibits, is distributed rather than any excerpt. These third parties should recognize that the furnishing of this report is not a substitute for their own due diligence and should place no reliance on this report or the data contained herein that would result in the creation of any duty or liability by Pinnacle to the third party.

The attached exhibits in support of our findings are an integral part of this report. These sections have been prepared so they document our actuarial assumptions and judgments. Judgments about the conclusions drawn in this report should be made only after considering the report in its entirety. We remain available to answer any questions that may arise regarding this report. We assume that the user of this report will seek such explanation on any matter in question.

Our conclusions are predicated on a number of assumptions as to future conditions and events. Those assumptions, which are documented in subsequent sections of this report, must be understood in order to place our conclusions in their appropriate context. In addition, our work is subject to inherent limitations, which are also further outlined and discussed later in this report.

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RELIANCES AND LIMITATIONS

We have prepared this report in conformity with its intended use by persons technically competent in the areas addressed and for the stated purposes only.

We have relied upon data and information supplied by members of the Ohio Department of Natural Resources – Division of Mineral Resources Management (ODNR-DMRM) staff including Permitting & Bonding, Forfeiture and AML, Regulatory and Data Management; we have also relied upon publically available industry data.

There is a limitation upon the accuracy of these estimates in that there is an inherent uncertainty in any actuarial estimate of future costs. This uncertainty is due to the fact that the ultimate liability for claims is subject to the outcome of events yet to occur, e.g., the likelihood of permit holders running into financial difficulty and default, the size and cost of reclamation, changes in the standards of reclamation and desired speed of reclamation. While there are no standard techniques for which to develop estimates for these specific issues, in our judgment, we have employed techniques and assumptions that are appropriate and the conclusions presented herein are reasonable, given the information currently available. However, it should be recognized that future loss emergence will likely deviate, perhaps materially, from our estimates.

We have relied on the data provided without independent audit or verification on the part of Pinnacle to develop our estimates of potential future reclamation cost. We have reviewed this data for consistency and believe it to be reasonable and accurate; we have also assumed that we have been provided with all information relevant to our analysis. The accuracy of our results is dependent upon the accuracy and completeness of this underlying data. Therefore, any material discrepancies discovered in this data by the Fund should be reported to us and this report amended accordingly, if warranted. We also worked with the ODNR-DMRM staff to understand the operation of the Fund, the reclamation process and the underlying data provided but only to the extent such information may have affected our analysis. While we have not anticipated any extraordinary changes to the economic, legal, or social environment which might affect the cost and frequency of default, we have recognized the current state of the Ohio coal mining industry in selecting our near term forfeiture rates, relying on the RFFAB's judgement of the impact of current economic conditions.

Our estimates are provided net of underlying performance security (also known as performance bonds or bonds). An independent evaluation of the quality of the security provided by each operator is outside the scope of our engagement. We have assumed that all of the underlying security protection will be valid and collectible. Contingent liability may exist for security recoveries (e.g., bond forfeiture amounts) that may prove to be uncollectible. Should such liabilities materialize, they would be in addition to the net liability estimates (i.e., net reclamation costs) contained herein.

We estimate nominal costs at an expected level (50% likely that actual costs will be below our estimate and 50% likely they will be above), then apply inflationary factors, and finally discount to present values using investment

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rates derived from the US Treasury, recent returns of the Fund, and discussions with the RFFAB. Discounting is reliant upon the investment rate and timing of payments, both of which are assumptions in this model and are subject to potentially high variability. Looking at future payments on a discounted basis could unintentionally remove a level of conservatism not intended by the RFFAB. For financial statement purposes, the Fund's liabilities might be better stated on an undiscounted basis. Exhibits 2.2 and 2.3 show the claims liabilities for land reclamation and water treatment before the impact of cost inflation and discounting (Columns 1 and 4), after the impact of cost inflation but before discounting (Columns 2 and 5), and after both cost inflation and discounting (Columns 3 and 6). The difference is most profound on the water treatment liability, where a 75 year payout is assumed.

When reviewing our findings, it is important to note certain implications of a risk pool. The entire retained risk remains with the pool, which likely exposes this entity to greater potential fluctuations in financial experience than does a first-dollar insurance program. The Fund should have sufficient financial capacity to reserve for and withstand those fluctuations. Actual losses in excess of projected losses will have to be paid by the Fund. It is not possible to estimate such fluctuations with complete accuracy; however, the effects of such fluctuations can be reduced by the funding of a provision for contingencies (a margin for the risk of adverse deviation from the expected loss levels). We have not calculated such risk margins or estimated confidence levels in the scope of our review; however, we have modeled various shock loss scenarios to simulate the impact of a catastrophic event.

An important factor bearing on a risk pool's financial capacity is the existence of an excess insurance program. Excess insurance is generally considered an integral part of programs with the potential for catastrophic losses. Mine reclamation claims are characterized by this potential. We understand that the Fund does not currently have excess insurance protection.

Please note that for the purposes of this report, the Performance Security Estimate (PSE) and Central Tracking System (CTS) data was provided as of May 9, 2019.

Further reliances and limitations are contained in the subsequent text, and in the exhibits accompanying the text.

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EXECUTIVE SUMMARY

There are several ways to view financial soundness. We find that the Fund is solvent on a short term basis as the current Fund assets (\$22.2 million) exceed the current Fund outstanding liabilities and obligations for forfeited reclamation projects (\$2.94 million). For longer-term solvency, the measurement compares the current available Fund assets with the Fund's long term expected exposure or liability (\$21.6 million on a present value basis of expected land reclamation and long-term water treatment costs of current permits plus the administrative expense to settle the liabilities). We believe the Fund currently meets the criteria for long term solvency to cover expected liabilities and expenses. This is not to say that the current Fund balance is adequate to cover catastrophic events as described in the next paragraph.

Another indicator of financial soundness is the Fund's ability to withstand a shock loss. It would take 9 more years of non-forfeitures before the Fund could cover an average loss and 27 more years to cover the forfeited permits of the failure of the fifth largest permit holder. The 2017 analysis resulted in projected Fund balances that would cover the failure of an average loss in two years or the failure of the fifth largest permit holder in nine years. Several factors have caused the increased time periods for the 2019 analysis compared to the 2017 analysis. First, the fund balance is lower than in the 2017 analysis due to the State of Ohio withdrawing \$5 million from the Fund in the 2017 biennium budget bill. The cost of reclamation associated with the Valley Mining forfeiture sites has also impacted the fund balance. In addition, the average potential liability has increased due to an increasing overall potential liability and a decrease in the number of permits. If the largest permit holder fails, the Fund would need over 150 years of non-forfeitures in order to cover the loss. See Exhibit 1 for additional details.

To further describe the situation, if the Ohio law was changed somehow closing the Fund at this time to any new permits, the future expected revenues from the severance tax from the operating permits currently covered by the Fund for future forfeiture potential plus the current Fund balance would appear to provide sufficient capital to finance the estimated reclamation cost from the long term expected forfeiture of some of the 149 permits included in the Fund today. However, an average shock loss today, on top of the expected forfeitures, would move the Fund into a negative cash flow position within twelve years. Our long term solvency measure is intended to compare the current balance with the exposures currently in place in a fashion similar to the method used to judge the solvency of insurance or bonding companies.

As with prior studies, through the efforts of the engineers with the ODNR-DMRM, we have developed an estimate of the total potential cost to reclaim all the subject mining operations covered by the Fund. In general, we note that underlying performance security provided through the private insurer/bonding community reduces the potential liability of the Fund.

Thus, the total potential cost to the Fund equals the total potential cost for all reclamation efforts less the underlying performance security. This potential Fund figure should be viewed as the maximum possible cost or

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the worst case scenario (although, should a provider of the performance security also default, the Fund would also be obligated for the reclamation cost covered by that provider).

The Fund is involved in assuming financial risk for an exposure that is categorized as low frequency of claims but very high severity in dollar terms, when an event (default) does occur. There are currently 22 mining companies with coal mine related permits in the state of Ohio covered by the Fund and included in our study. Some of the operators have only a single permit while other larger operators have a dozen or more mining permits. The operator with the most coal mining permits in Ohio (Westmoreland Coal Company) currently has 51 permits in the Fund.

The small number of operators and the tremendous potential liability from a few of the larger operators create a significant risk to the Fund from a concentration of risk perspective. For example, should one of the permit holders with only a single coal mining permit become financially unable to meet their reclamation obligations, the cost to the Fund might fall anywhere from no cost (liability covered through bonding) to over \$14 million. See Exhibit 7.1a. With the current Fund balance, the reclamation cost of a forfeiture of a single permit holder can be financed.

On the other side of the spectrum, should one of the permit holders with a large number of sites become financially troubled, the cost to the Fund for reclamation could easily exceed \$50 million, with the largest potentially exceeding \$200 million. See Exhibit 7.1b.

Our analysis includes the development of the Expected Cost to the Fund. We define the expected cost as the long run average that considers both the potential of a permit holder's forfeiture along with the potential cost of that forfeiture. If the Fund was collecting a single "premium" from the operators at the start of each project for providing this financial security as do insurance and bonding companies, this Expected Cost (along with any operating expenses) would be the basis for the "premium" required from each site and operator.

With this analysis, we have developed estimates based upon an annual forfeiture rate of 0.50%, as developed in Exhibit 5.2. Our method of estimating expected ultimate loss applies the selected forfeiture rates to every permit every year to determine an average expected loss.

The forfeiture rate selection is based upon historical Ohio forfeiture information and forfeiture rates developed by using Kentucky and West Virginia information. While the frequency increased in the other states, there are no new incidents in Ohio since our 2017 analysis. Therefore, we determined that maintaining the 0.50% selected frequency for Ohio used in our prior analysis was still reasonable. This equates to giving Ohio's data 67% weight in the selection, and the other states combined received 33% weight. (In our prior analysis these figures were 60%/40%, respectively.) The selection also considered the current economic and operational state of the Ohio coal mining industry as gleaned by discussions with the RFFAB.

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To say it another way, with our recent analyses the forfeiture rate selection is heavily driven by actual historic Ohio forfeiture experience which was omitted from some of our earliest studies. The previous omissions were intentional because the recent years of no forfeiture activity was not thought to be very credible. While it would not be prudent to assume that the future forfeiture rates over the long term would remain as low as they have been in recent years, the stability of the program should be recognized, hence the application of the 67% weight to Ohio's long term average forfeiture rate.

We continue to develop a range of land reclamation cost estimates, as was started with our 2017 analysis. Pinnacle has developed a low estimate and a high estimate based on adjusting the forfeiture rate. For the low estimate, the forfeiture rate is based on an 80% weight to Ohio and a 10% weight to both Kentucky and West Virginia. The result is a low scenario forfeiture rate equaling 0.33%. The high estimate is based on a 55% Ohio weighting and a 22.5% weighting to Kentucky and West Virginia. This weighting results in a high scenario forfeiture rate of 0.67%. These low and high forfeiture rates are applied to the land reclamation cost calculations to produce a range. See Appendices A and B which include the development of the low and high forfeiture rates, respectively.

We include a direct reflection of reclamation cost inflation and discounted the future liabilities to present value using interest rates based on recent US Treasury information. The cash flow tables in Exhibit 1 are presented on a discounted to present value basis.

Based on our analyses, we have developed a net land reclamation Fund Expected Cost estimate for the permits currently included in the Fund of \$19.4 million in Exhibit 2.2. This estimate compares to our range estimates of \$13.9 million on the low end and \$24.8 million on the high end. See Appendices A and B which include the summary of the land reclamation expenditures under the low and high forfeiture rates, respectively.

Also, we have developed a long-term water treatment Fund Expected Cost estimate for existing permits of \$0.65 million in Exhibit 2.3.

In Exhibit 1, Cash Flow, we display the expected revenues that will cover the above costs. Tonnage fees from the permits associated with the above costs are expected to accumulate to \$5.57 million over the next 75 years (the projected time period to work through the long-term water treatment liabilities). During that same time, interest income earned on the positive fund balance would be expected to accumulate to \$17.3 million. This report does not study the potential of new permits, either for income or for costs.

In order to cover the expected costs for land reclamation and long-term water treatment of the current permits, the Fund should have an approximate \$21.6 million balance (\$19.4 million for land plus \$0.65 million for water plus \$1.59 million for operating expense). This can be thought of as the funding level to be 50% confident that the funds will adequately cover expected costs, that is, half the time this level of funding would be adequate, and half the time it would be insufficient. It is reliant on the assumptions explained throughout this report.

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We have incorporated a shock loss scenario that examines how the forfeiture of an average-sized permit holder would affect the Fund: resulting in an estimated \$30.3 million in additional liability to the Fund. See the derivation in Exhibit 7.1b and the cash flows in Exhibit 1 - Shock Loss. For practical considerations, the cash flow exhibit incorporates a \$3.50 million cap on land reclamation costs per year. This spreads the shock loss out over a fifteen year period. It is unlikely that the activities required to reclaim the land associated with the hypothetical shock loss could be performed in a shorter time period.

To adequately cover the expected cost of the current permits and the shock loss of an average-sized permit, the Fund would need to build to a balance of \$51.9 million (\$19.4 million for land plus \$0.65 million for water plus \$1.59 million for operating expense plus \$30.3 million). It is informative to note in Exhibit 1 – Shock Loss that even a shock loss as described above with reclamation costs beginning in 2022 would move the Fund to a negative balance in 2030. Given the current economy and the financial condition of some of the coal operators in Ohio, the RFFAB should consider to what extent it wants to fund for a shock loss, whether it be an average loss or one far greater as displayed in Exhibit 7.1b.

Please note that the analysis considered the possibility that a permit in danger of forfeiture could be taken over by another more financially secure operator, who would potentially assume the previous permit holder's assets, mining rights and reclamation responsibilities. This replacement action eliminates the reclamation cost to the Fund, potentially saving millions of dollars for the Fund. By using Ohio's historic forfeiture experience, we account for that activity to the extent it has occurred in the past, including the recent activity for Valley Mining, Inc.

There are advantages that insurers have that are not available to the Fund. The most obvious advantages include:

- The spread of risk across insureds, locations, industries and lines of business;
- The ability to individually underwrite and price each risk; and, maybe most importantly,
- A level of surplus (available capital) in addition to the collected premium which allows an insurer to survive years and periods where the actual costs exceed (and sometimes greatly so) the expected long run costs. When actual annual costs exceed long-term expected annual costs, the insurers have this operating capital. In contrast, the Fund until recently had been using recent proceeds to pay for the current reclamation projects. The Fund has now begun and continues the capital accumulation process.

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SUMMARY OF FINDINGS

Based upon the methodology and assumptions described above, we have estimated the present value of potential expected liability of the Fund as follows:

Liability	Net Present Value Expenditures
Land Reclamation	\$19,366,472
Water Treatment	645,823
Administrative Expense	1,590,000
Total	\$21,602,295

The above calculations are found in Exhibit 2.1. This compares to our 2017 total estimate of \$25.1 million, and our 2015 total estimate of \$36.3 million.

There can be considerable variation around this estimate due to:

- The limited number of coal operators within the state of Ohio,
- The uncertainty with respect to future forfeiture rates,
- The emergence of water treatment liability,
- The number of operators with multiple permits,
- The relationship of the performance security provided by the private insurance market and estimated cost to reclaim the various sites along with the large size of some of the operators.

For example, should one of the largest operators be unable to meet its obligations, the potential cost to the Fund from a single operator could approach \$202.2 million. An additional \$30.3 million would be needed to cover an “average” shock loss. Please see Exhibit 7.1b.

In actuarial and insurance regulatory language, the Fund has significant risk of material adverse deviation from the estimated expected loss. This risk can easily be seen in two contexts. The first would be in comparing the largest single potential cost with the average potential cost. On an operator basis, this is \$202.2 million versus \$30.3 million, or a relationship of 6.7 to 1. Please see Exhibit 7.1b. The second context would be a comparison of the largest single potential loss with the current available capital in the Fund, or \$202.2 million to \$22.2 million (as of January 2019), a ratio of 9.1 to 1. Even the average potential cost of \$30.3 million exceeds the Fund’s current capital of \$22.2 million.

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Pinnacle has calculated a range of cost estimates in order to account for the variation around our estimate. As previously mentioned, the range is based on adjusting the selected forfeiture rate of 0.50%. The table below displays the results.

Liability	Net Present Value Expenditures		
	Low Estimate 0.33% Forfeiture Rate	Current Estimate 0.50% Forfeiture Rate	High Estimate 0.67% Forfeiture Rate
Land Reclamation	\$13,892,288	\$19,366,472	\$24,840,657
Water Treatment	645,823	645,823	645,823
Administrative Expense	1,590,000	1,590,000	1,590,000
Total	\$16,128,111	\$21,602,295	\$27,076,479

Our range of estimates only affects the land reclamation expenditures. The water treatment and administrative expenses do not vary by scenario.

The establishment of the forfeiture rate is an exercise involving several assumptions and financial judgments. The benefit is a reasonable range of outcomes to consider when making financial decisions. While we believe the above range is reasonable, it should not be interpreted to incorporate all possible outcomes. (To consider all possible outcomes would result in a range from no more forfeitures at the low end, to 100% forfeitures at the high end.)

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FUND-SPECIFIC RISK FACTORS

Actuarial estimates and property and casualty loss and expense reserves are inherently uncertain because they are dependent on future contingent events. Also, these reserve estimates are generally derived from analysis of historical data, and future events or conditions may differ from the past. The actual amount necessary to settle the unpaid claims may therefore be significantly different from those contained herein.

The following provides major risk factors and/or particular conditions underlying the risks and uncertainties that Pinnacle considers relevant to the Fund's estimates of loss and expenses:

- The Fund's balance (i.e., net assets or surplus) and potential vulnerable financial condition of the coal operators. Our analysis of the Fund's losses and expenses implicitly assumes the Fund is viable. If it is not viable (e.g., due to developments such as regulatory actions, legislative actions, inability to meet claim payments, etc.), liabilities may be affected in ways that cannot be quantified at this time.
- The Fund's potential expenditures under a shock loss scenario are large in relation to fund balance. As a result, reasonably expected fluctuations of actual versus expected results may be material to the fund balance.
- The Fund's historical forfeitures. While we have reflected these forfeitures in our analysis, the risk exists for forfeitures to occur in the future.
- The Fund does not currently have excess insurance to address catastrophic (i.e., shock) losses.
- The Fund reflects discounting of losses and expenses (i.e., expenditures reflect anticipated future interest income). The discounting creates uncertainty in addition to the usual uncertainty in projecting ultimate loss and expense amounts. Discounted estimates are also influenced by variations in the timing of actual loss and expense payments versus the rate of payment assumed in discounting estimates to present value, and variations in the actual investment yield on the assets underlying the liabilities versus the assumed investment yield used in discounting. The discount is 74% of the projected fund balance by calendar year 2096.
- The Fund insures coal mine reclamation liability coverage with net reclamation costs that are large in relation to the fund balance. Maximum exposure to a single risk is \$7.24 million (see Exhibit 7.1a). Consequently, it is possible that a single forfeiture could occur that would represent a high percentage of the fund balance.
- Demonstration of contemporaneous reclamation. Failure of coal mining operators to undertake contemporaneous reclamation has proven to increase reclamation costs, especially during forfeitures.

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To the extent operators are not subject to this requirement, the indicated losses and expenses contained herein may be understated.

- The Fund writes a concentration of risk related to a small group of entities. This concentration increases the uncertainty in the estimated expenditures and projected fund balance as a consequence of unforeseen changes in Ohio's legal and economic environment.
- The Fund only writes a small volume of business. Loss projections based on small volumes of data tend to be volatile.

Due to the Fund-specific risk factors indicated above, we believe that there are significant risks and uncertainties that could result in material adverse deviation in the losses and expenses.

The absence of other risks and uncertainties from this listing at this time does not imply that factors will not be identified in the future as having been a significant influence on the Fund's losses and expenses. The potential exists that a combination of the above factors and other conditions might arise, thus increasing the Fund's risk of material adverse deviation.

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OHIO RECLAMATION FORFEITURE FUND BACKGROUND

The current Fund was significantly revised in 2007 by the State Legislature to provide reclamation coverage to eligible coal mine operators permitted by the State of Ohio in addition to the required private performance security for each site. This coverage is designed to step in to provide for funding the reclamation costs of coal mining sites in the event of financial default of the permit holder. The mechanisms prior to House Bill 443 in 2007 had not accumulated a significant amount of capital or revenue for its operations but the Bill did assign the responsibility for the on-going cost associated with the prior operator defaults not yet fully reclaimed to the Fund. Fortunately, there have been no new forfeitures requiring Fund financial support from year-end 2006 through year-end 2013. (There were 6 forfeitures from Valley Mining in 2014.) As of the end of January 2011, there were no permits/sites on the list to be reclaimed under the direction of the Fund through the efforts and oversight of the ODNR-DMRM. All reclamation work on permits forfeited prior to 2006 was substantially completed by year-end 2010.

The coal mine permit holders must maintain performance security (bonding) coverage in the amount of \$2,500 per acre of land based upon the acreage designated to be affected in the given year as allowed on the permit. The performance security can be obtained from the private insurance market or financed by some other means such as letters of credit, certificates of deposit, cash or trust agreements.

The Fund provides additional forfeiture coverage for reclamation efforts on underground mines, surface mines and facility permits. Facility permits might include operations such as preparation plants, coarse refuse and slurry areas. The eligible mine operators who select to be reliant on the Fund for costs above the performance security pay a severance tax (i.e., tonnage fee) to the Fund which varies from \$0.12 to \$0.16 per ton of coal extracted based upon the Fund's balance. The required amount of private performance security is based upon the affected acreage on each permit issued by the ODNR-DMRM. Many operators have submitted permit applications with a significant amount of land not currently affected by mining. The extra acreage has been included within the permit and performance security up front to eliminate the need for the operator to reapply or post additional performance security each time mining operations commence on another parcel of land. Also, some eligible operations, by choice or requirement, are fully covered by private performance security and not part of the "pool" operated by the Fund.

The total potential reclamation cost estimate is based upon the ODNR-DMRM engineer's assessment of the approved mining and reclamation plan on each permit including any on-site processing facilities covered by the Fund. This cost estimate is commonly referred to as the PSE. Each PSE uses unit costs derived from the historical reclamation costs on Abandoned Mine Land projects, cost data from R.S. Means and yearly direct inquiries for quotes. These unit costs are applied to the approved mining and reclamation plans to assess the total potential cost in the event of forfeiture. Prior to our 2009 analysis, this PSE information had not been routinely established at the beginning of each permit operation nor reviewed annually to assess the potential cost to the Fund. It should be noted that the forfeiture coverage is now updated periodically by the ODNR-

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DMRM during the active mining operation period of the mine and also during the reclamation process until the permit is released by the ODNR-DMRM.

Recently, the Advisory Board became concerned that PSEs were too conservative and did not portray an accurate representation of the total liability of permits in the Fund. In 2016, a workgroup was established to develop procedures to calculate accurate cost estimates based on field conditions. This group consisted of individuals from Permitting, Inspection, AML, and Industry. As a result, a more advanced PSE procedure was implemented to provide a more precise estimate of Ohio's cost of the disturbed land in the event of a permit forfeiture.

The amount of the required performance security on a permit is adjusted during the reclamation process based upon the acreage affected. The amount of the private performance security required on any given affected acre is decreased by 50 percent upon satisfactory completion of the procedure to backfill and re-grade the land (phase 1 of reclamation). Another 35 percent decrease in required performance security is made when the land is re-planted and re-growth or re-vegetation has been satisfactorily completed in accordance with the requirements set forth in the Ohio Revised Code and Ohio Administrative Code (law and rule) (phase 2 of reclamation). The final 15 percent of the required performance security amount is typically released in about eight years following the date of planting, if no additional action was necessary by the operator to achieve satisfactory reclamation. It should be noted that the private performance security is not related to the estimated reclamation cost but rather a fixed amount of coverage (\$2,500) per acre affected. As noted previously, at any site, the operator may elect not to rely upon the financial support of the Fund and choose to provide complete private performance security in the full amount of the estimated reclamation cost (using the same estimation methodology and unit cost values as the permits which are eligible and choose to rely upon the Fund).

In the case of default by the operator, the private bonding company may elect to reclaim all or a portion of the site based upon the amount of performance security remaining as surety bond. The remainder of the site reclamation effort would be turned over to the Fund possibly with the performance security payment of up to \$2,500 per acre depending upon the amount previously released. Each coal mine operator may have multiple active sites (permits) with affected acres at various phases at any time. This situation with multiple permits from a single operator results in additional concentration of risk.

As of February 4, 2019, there were 94 active permits for coal mining operations in Ohio that were part of the Reclamation Forfeiture Fund "Pool". There were also 55 permits covered by the Fund with no future mining activity planned that had "Final Maps" accepted by the ODNR-DMRM. See Exhibit 7.6a. Final Maps reflect the cumulative affected area on mining operations and are used to determine an accurate reclamation cost estimate on each permit following completion of mining.

From the data provided for this analysis, we had ODNR-DMRM engineer's performance security estimates on all 149 Fund-covered permits from 22 different operators. Of the 149 permits with PSEs, the current PSEs for 110

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permits are greater than the possible funding from bonding, letters of credits, deposits or other instruments (private performance security). Please see Exhibit 7.2. The operator counts have been adjusted to reflect the fact that some permit holders are part of one umbrella company structure. This issue is noted due to the impact that organizational structure has upon the concentration of risk. If a multiple permit holding operator should run into such financial difficulty that it defaults, we have assumed that all permits under that umbrella corporation are impacted and default as well.

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CHANGES IN THE DATA SINCE PREVIOUS REPORT

We have compared the Performance Security Estimates for the 144 permits which had Performance Security Estimates in the data included in the previous report as well as Performance Security Estimates in the current data provided by the engineers from the Ohio Department of Natural Resources. Of these permits, the PSEs on 15 permits did not change. For 72 permits, the PSEs in this year's data were lower than the PSEs included in the previous data by a total of \$111.6 million of potential reclamation cost. For the remaining 57 permits, the performance security estimates increased by a total of \$114.4 million since the data for the last review was collected. The overall net change is an increase in the Performance Security Estimate or the anticipated cost of reclamation of \$2.79 million, an improvement brought on as part of the ODNR-DMRM's effort in refining their PSE estimates. Please see the bottom of Exhibit 7.6a.

As should be expected, a grand majority of the permits in the database are from surface mining operations. Of the 149 permits included with PSEs, only 16 permits are related to underground mining operations and another 19 permits are related to facility permits. Please see Exhibits 7.3a, 7.4a, and 7.5a.

Of the 94 active permits, we have PSE data for 66 surface mining operations, 11 active permits for underground mining operations and 17 operating facilities permits. Please see Exhibits 7.3a through 7.6a. We note that the preceding information reflects only those permits covered by the Fund and not those that have elected or are required to operate under full private performance security.

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Analysis of the Reclamation Forfeiture Fund

HISTORICAL FORFEITURES

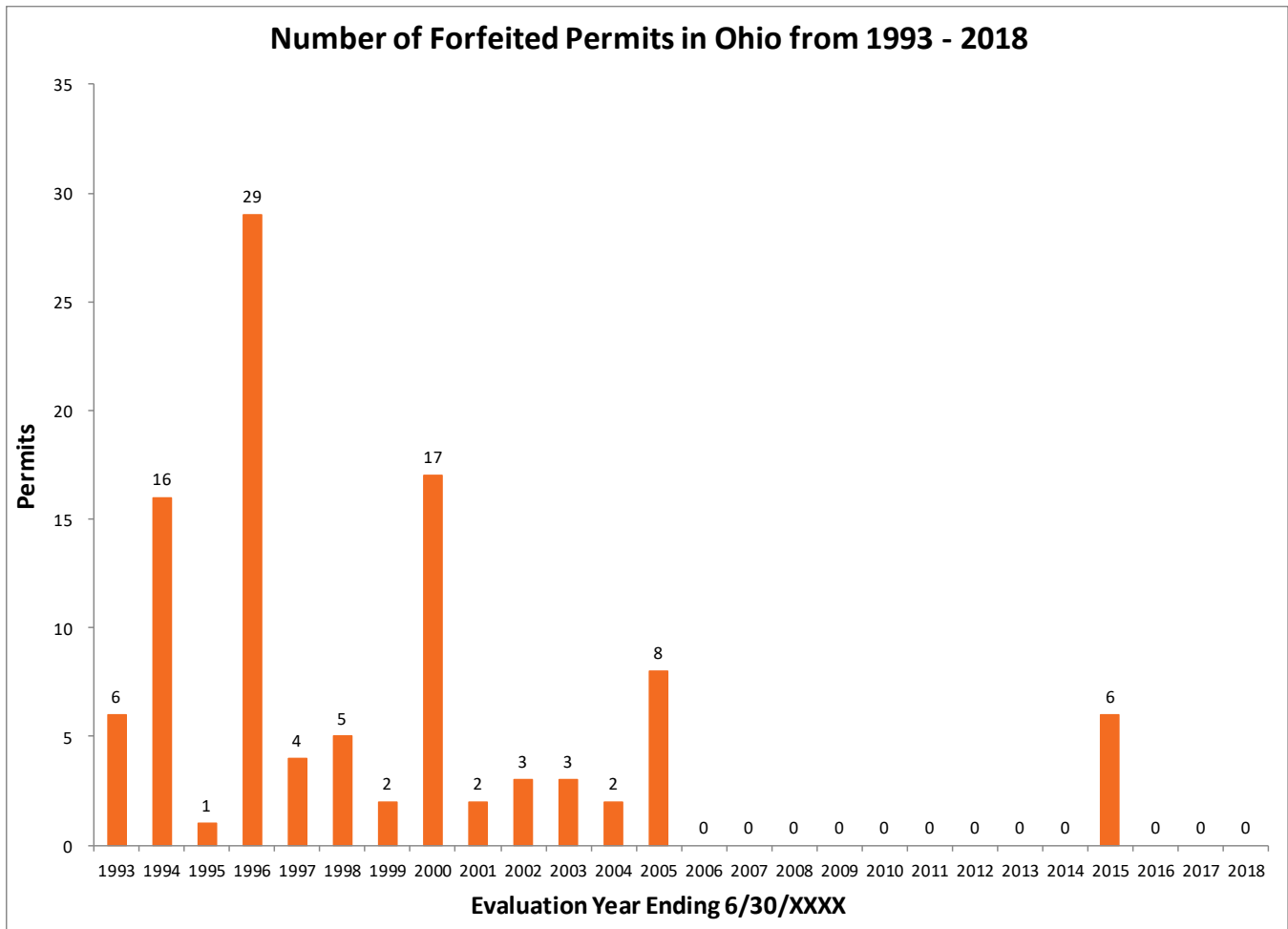
As background information, the ODNR-DMRM provided the historical forfeiture order information available from the US Department of the Interior's Office of Surface Mining (OSM) covering the past 26 years by the year in which the order was made. Since 1993, there have been a total of 104 bond forfeiture orders to 33 permit holders. This results in an approximate average of 3 forfeitures per permit holder. The actual number of forfeiture orders per permit holder has ranged from 1 to 21 permits.

From years 2001 through 2014, there were only 18 forfeiture orders. Seven of these forfeiture orders in year 2005 were terminated because the company was able to reclaim and continue operation on the affected sites. These forfeiture orders did not result in any dollars being requested from the Fund to assist with the reclamation process. Even more impressive, there were no forfeiture orders from years 2006 through 2014. Unfortunately, in October of 2014, permit holder Valley Mining incurred 6 forfeitures. However, even considering this, the lack of recent forfeitures otherwise has allowed the Fund to cover the reclamation costs of previously forfeited locations including those forfeited prior to House Bill 443.

More importantly, the Fund has begun accumulating capital to cover potential future forfeitures of currently covered permits. In the early 2000s before House Bill 443, this capital accumulation process had been further slowed by the insolvency of a performance security provider (bond insurer) for two of the permit holders, one of which was an operator with a significant number of permits.

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Analysis of the Reclamation Forfeiture Fund



Source, Ohio Department of Natural Resources, Division of Mineral Resources Management

We noted in the previous analysis that similar to states that experience hurricanes, the lack of forfeitures in the recent past prior to evaluation year ending June 30, 2015 does not provide support for an assumption that there will be no forfeiture events in the future. As reflected in the graph above, this assertion was proven true when the Fund experienced 6 forfeitures in October 2014.

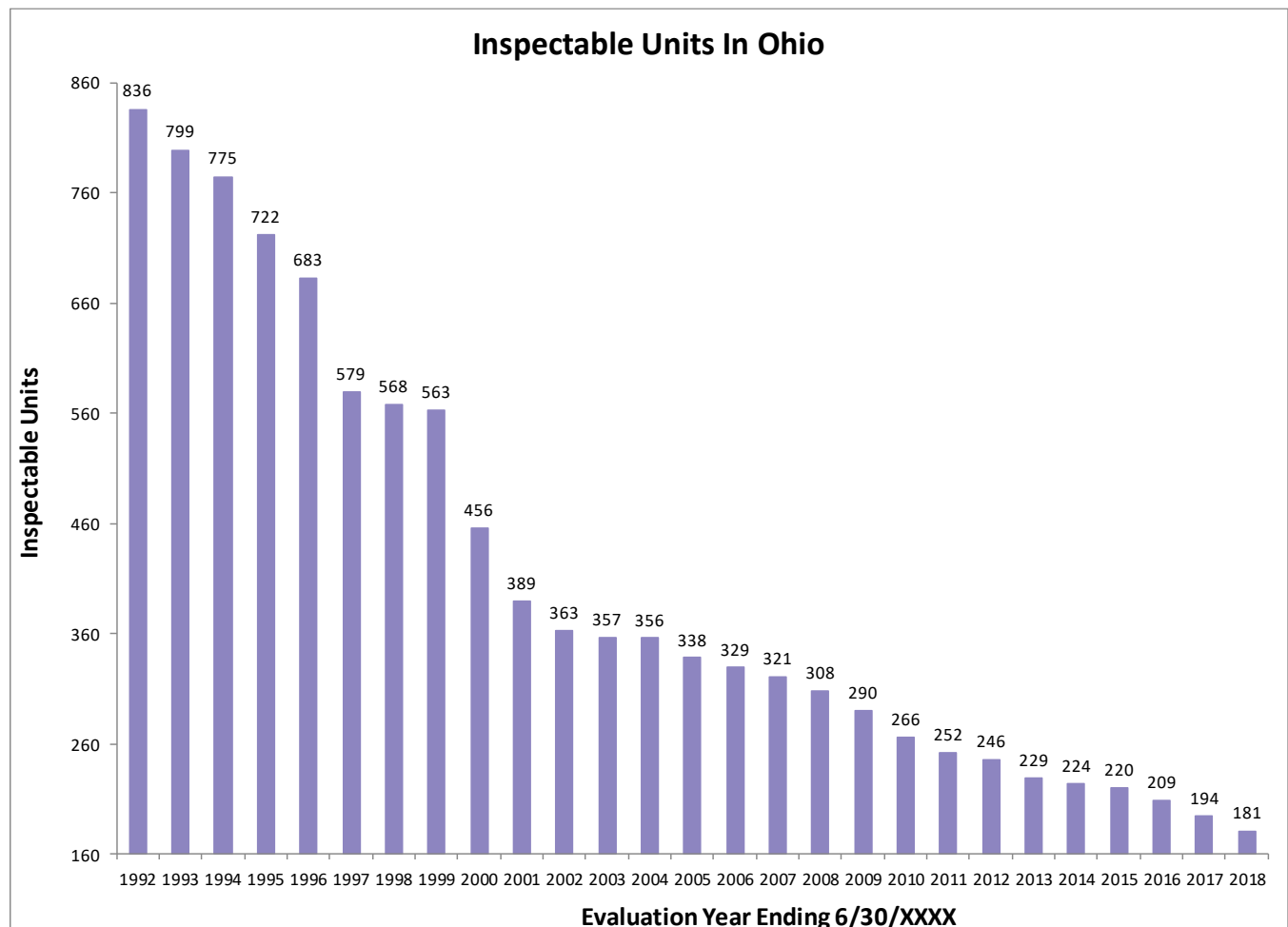
The average annual number of forfeiture orders over the twenty six year available period has been 4.0 per year. We note that from 2001 to 2014, the annual permit forfeiture order frequency had declined to 1.3 permits per year. And most notably, from 2006 to 2014 there were no forfeitures. However, the good fortune ended in year 2015 when 6 permits were forfeited. We also note that although there were official forfeiture orders made on eight permits during calendar year 2005, the Fund was only called upon to provide reclamation capital on one of these sites – a very positive development for the Fund’s financial situation. We were also provided with forfeiture information as compiled by the ODNR-DMRM which showed forfeiture activity during 1989 to 1992 at roughly the same levels as the 1993 to 1995 period.

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If we measure the annual number of forfeitures at the Permit Holder level rather than the permit level, the long term permit holder forfeiture frequency has been less than two operators per year.

The number of inspectable units (permitted mining operations) in Ohio over the 27 year period is displayed in the chart below. Over the period of time 1992 through 2018, there have been anywhere from 836 to 181 inspectable units in Ohio. These figures are provided by the Office of Surface Mining from their publicly available records.



Source: Office of Surface Mining reports

The average forfeiture rate per number of permits issued is 1.02%. This translates to an annual forfeiture rate of 0.05% based on an average lifetime of a permit of 21 years and adjusting for the fact that forfeitures rarely occur in the first two years of a permit's active life. Please see Exhibit 5.2. Note that the calculation of forfeiture frequency includes the seven 2005 permits discussed above that were eventually terminated. Since our goal is to estimate future frequency rates, it is prudent to realize that future remediation efforts leading to terminated forfeiture orders may not be as successful.

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Comparing Ohio's historic 0.05% forfeiture rate to the Kentucky and West Virginia forfeiture rates of 1.43% and 1.02%, respectively, Pinnacle has selected a projected Ohio annual forfeiture rate of 0.50%. While the frequency increased in the other states, there are no new incidents in Ohio since our 2017 analysis. Therefore, we determined that maintaining the 0.50% selected frequency for Ohio used in our prior analysis was still reasonable. This equates to giving Ohio's data 67% weight in the selection, and the other states combined received 33% weight. (In our prior analysis these figures were 60%/40%, respectively.) The selection also considered the current economic and operational state of the Ohio coal mining industry as gleaned by discussions with the RFFAB.

The selection of the forfeiture rate of 0.50% reflects the inclusion of a mine status forfeiture rate adjustment factor (Exhibit 5.3). While we do not have historical data to determine the forfeiture rate adjustment factors, our selections are intuitively logical. We have also adjusted the final selected forfeiture rate to account for the impact created by the adjustment factors, rendering the overall impact revenue neutral.

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Analysis of the Reclamation Forfeiture Fund

ANALYSIS OVERVIEW AND GENERAL COMMENTS

For the current permits covered by the Fund, we have utilized the site specific current estimates of the total potential cost to reclaim all of the subject mining operations (Performance Security Estimate or PSE) from the engineers with the Ohio Department of Natural Resources – Division of Mineral Resources Management (ODNR-DMRM). We have combined the PSEs with estimated probability of forfeiture over the lifetime of the permit to develop an estimate of the total expected (or long term average) costs for the Fund.

The engineering estimation effort is now being undertaken by the ODNR-DMRM on a regular basis. At the same time, the new task force has developed a more accurate PSE procedure. This increased frequency of PSE updates greatly facilitates the monitoring of potential cost at the sites and the future analyses of the Fund's potential liability. These more accurate cost estimates generally produce results that are not as conservative as those provided to Pinnacle in prior years. Their impact has been brought directly into our estimation process.

Since the PSEs include all portions of the permit within a single figure, they are adjusted during our analysis to reflect the reported site operating status with respect to the various stages of mining and reclamation. A single permit may have various acres in process of achieving phase 1 release (all activity including active mining operations prior to completion of all land replacement), in the process of achieving phase 2 release (replanting and reforestation activity) and in the process of achieving phase 3 and final permit release (the waiting period prior to permit release).

In development of our estimation, we reflect that if a permit is forfeited, the underlying performance security provided through the private insurer/bonding community, letter of credit or other security provided would reduce the potential liability of the Reclamation Forfeiture Fund. Thus, the total potential cost to the Fund equals the total potential cost for all reclamation (PSE) less the underlying performance security (bond, etc.). This Fund potential cost figure should be viewed as the maximum possible cost or the worst case scenario, with one exception. In full disclosure of that one exception, we do note that should a provider of the performance security also default, the Fund would be obligated for the reclamation cost assumed to be covered by that provider.

Potential Fund Liability

Our analysis begins with estimates of total land reclamation cost (PSEs) for the 149 Fund-covered permits. In total, the engineer estimated reclamation cost is \$587.2 million. This value is reduced by \$42.4 million of available and required performance security. These adjustments to the initial PSEs result in a total Potential Fund Liability of \$544.8 million for land reclamation. Again, these total potential cost figures should be considered a worst case scenario - if each and every operator would forfeit all their permits and no providers of performance security default.

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Analysis of the Reclamation Forfeiture Fund

Expected Fund Cost

The combination of the potential cost (adjusted PSEs) and probability that the Fund will be called upon (forfeiture rates) determines the *Expected Cost* to the Fund. This Expected Cost being a combination of the possible cost and the long run probability of default or forfeiture over the life of the permit could be considered the long run average cost of future forfeitures to the Fund. If the Fund was collecting a single up-front “premium” from the operators to provide this financial security in a manner similar to insurance and bonding companies, this Expected Cost (along with any operating expenses) would be the basis for the “premium” required from each site and operator.

On an active permit basis, we reviewed the various acres in terms of amount of acres, type of mining operation, phase of operation (i.e., mine status), and underlying security coverage. The net adjusted PSE amounts reflect the total PSE less the underlying security. We develop the net expected cost of reclamation for every permit based on the net adjusted PSE and projection parameters (e.g., release rates, forfeiture rates, mine status adjustment factors) that reflect the average dynamics of all mining operations.

Our methodology follows a “cost times frequency” approach. This approach is commonly referred to as a frequency and severity analysis, where the frequency is the probability of forfeiture and the severity is the cost of reclamation. Under this approach we determine an expected average cost and an expected average frequency of a permit forfeiture occurrence. We apply these parameters to the expected exposure to derive an estimated cost.

We also note that while these are long term average projections, the actual results in any one year or series of years will vary, sometimes significantly, from the long run average. This is the nature of a low frequency/high severity risk such as this. For a similar example, we cite the cost of hurricane losses in a southern state. In some years, there will be no losses due to hurricane while in other years there will be significant losses. Most years are either well below or well above the long term average. The key is to generate sufficient capital in the less than average years to be available to cover the costs in the years where the costs far exceed the long term averages.

Forfeiture Rates

For our 2011 analysis, we obtained publically available financial information about some of the firms holding Ohio coal mining permits through sources such as Standard & Poor’s and Dun and Bradstreet. This potential default information was used to estimate the probability of an operator encountering financial difficulties such that the Fund would be called upon to assume the cost of the reclamation projects for each site of the firm.

Later we developed two additional estimates by using the probability of forfeiture estimates by permit type and permit issuance year from a West Virginia Special Reclamation Fund analysis.

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For our most recent analyses, we developed a forfeiture rate based on historic Ohio experience. We blended that with projected forfeiture rates in West Virginia and Kentucky. We determined that this measure was superior to the financial ratings as it should be directly related to the Reclamation Forfeiture Fund expected cost. The recent history of no forfeitures was fortunate, but it would not have been appropriate to assume the future long term forfeiture rate would also be zero, as proven in October 2014 when the Fund experienced 6 forfeitures. Hence, we use the long term historic average and include the surrounding state information to add stability and credibility to our method. Consideration is still being given to the forfeiture experience of neighboring states, particularly in light of the fact that events occurring for those states can also have an impact on Ohio.

We maintain the enhancements incorporated in our prior analyses, which are:

- An adjustment factor to the forfeiture rates to reflect mine status (active, final map, pending phase 1 release, pending phase 2 release, pending phase 3 release)
- Expanded release rates determined from historic data
- An estimated liability for long-term water treatment or long-term alternative water supply (Water)

Based on a number of estimates and assumptions, described later in this report, along with the PSE information from the permits in the Fund, we have developed an estimated land reclamation expected cost of \$19.4 million, reflecting inflationary trends and discounting to present value, both explained later in this report. See Exhibit 2.2. This compares to our estimate in the 2017 analysis of \$22.8 million.

Water

Effective September 30, 2011 House Bill 163 amended the Ohio Revised Code to account for long-term water treatment and long-term alternative water supplies. In the prior statute, long term water treatment was excluded from coverage by the Fund. House Bill 163 allowed the Fund to cover long-term water treatment for those permittees that are reliant on the Fund. It included a provision to allow eligible operators to fund the long term water treatment trust or alternative financial security (AFS) over a 5-year period and the Fund would be responsible to cover the unfunded portion until such time as the AFS was fully-funded (not to exceed 5 years). As discussed later in this report, we have estimated a liability of \$0.65 million to account for long-term water exposure on current permits. See Exhibit 2.3.

Shock Loss

Another financial measure of the soundness of the Fund would be its ability to absorb a shock loss without threatening the viability of the Fund. A shock loss for purposes of this study could be considered to be the largest operator, carrying the largest liability, forfeiting all its permits. In this case, an additional \$202.2 million in estimated liability would become the responsibility of the Fund.

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In prior conversations between the RFFAB and coal producers it has been postulated that four of the largest operators would be less likely to be involved in a failure. However, there was some concern expressed about the financial difficulties facing large (and small) operators. For purposes of this study we considered the impact of a shock loss that was equal to the average liability for all operators in Ohio who are reliant on the Fund. See Exhibit 1 – Alternative. That amounted to an additional \$30.3 million of estimated liabilities for an “average” shock loss. For comparison purposes, this is approximately \$23.3 million lower than the estimate of the cost for the fifth largest carrier defaulting. See Exhibit 7.1b.

While shock losses are highly unlikely to occur because of the financial strength and attractive value of the assets of the larger operating companies, it is prudent to be aware that remote possibilities do exist.

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Analysis of the Reclamation Forfeiture Fund

ACTUARIAL ANALYSIS

As described briefly above, the objective of our analysis is to measure the Expected Cost to the Fund of the current operating mines and all facilities currently in various phases of reclamation.

Data

The ODNR-DMRM has provided the following information by permit in an Excel spreadsheet format:

1. The Performance Security Estimate, which is the ODNR-DMRM engineer's assessment of the cost to reclaim the site based upon the approved mining and reclamation plan (described more fully later in this report) for all 149 mining permits covered by the Fund.
2. The performance security on-hand in total for each site along with the amounts separated into the three phases of the reclamation process (also described more fully in a later portion of the report).
3. The distribution of acres on the permitted site between the three phases of operation.
4. The Operator name by permit.
5. The provider of the performance security by permit.

Performance Security Estimate Groupings

The 149 PSEs are provided by the ODNR-DMRM engineers in the following two categories:

- A. 55 Permits that have an approved Final Map and coal extraction is completed
- B. 94 Permits still extracting coal and thus do not have an approved Final Map

Performance Security (Bond) from Insurers

We next compare the estimated total cost of site reclamation developed in the prior step against the amount of private performance security on hand as provided from the ODNR-DMRM data base (Central Tracking System - CTS) files. The private performance security, available should forfeiture occur, may be provided through any of the following means:

- Bond from an insurer licensed to do business in Ohio
- Letter of credit
- Certificate of Deposit
- Cash
- Trust agreements

The amount that the estimated total site cost exceeds the performance security on hand for the site is the potential reclamation cost to the Fund. There are a number of sites where the performance security on hand is greater than the Performance Security Estimate. Of the 149 permits included in the analysis, 39 permits, or 26%, fall into this category and contribute zero dollars to our estimated potential and estimated expected Fund costs. In these cases, the Fund would have no reclamation liability in the case of operator default. But we

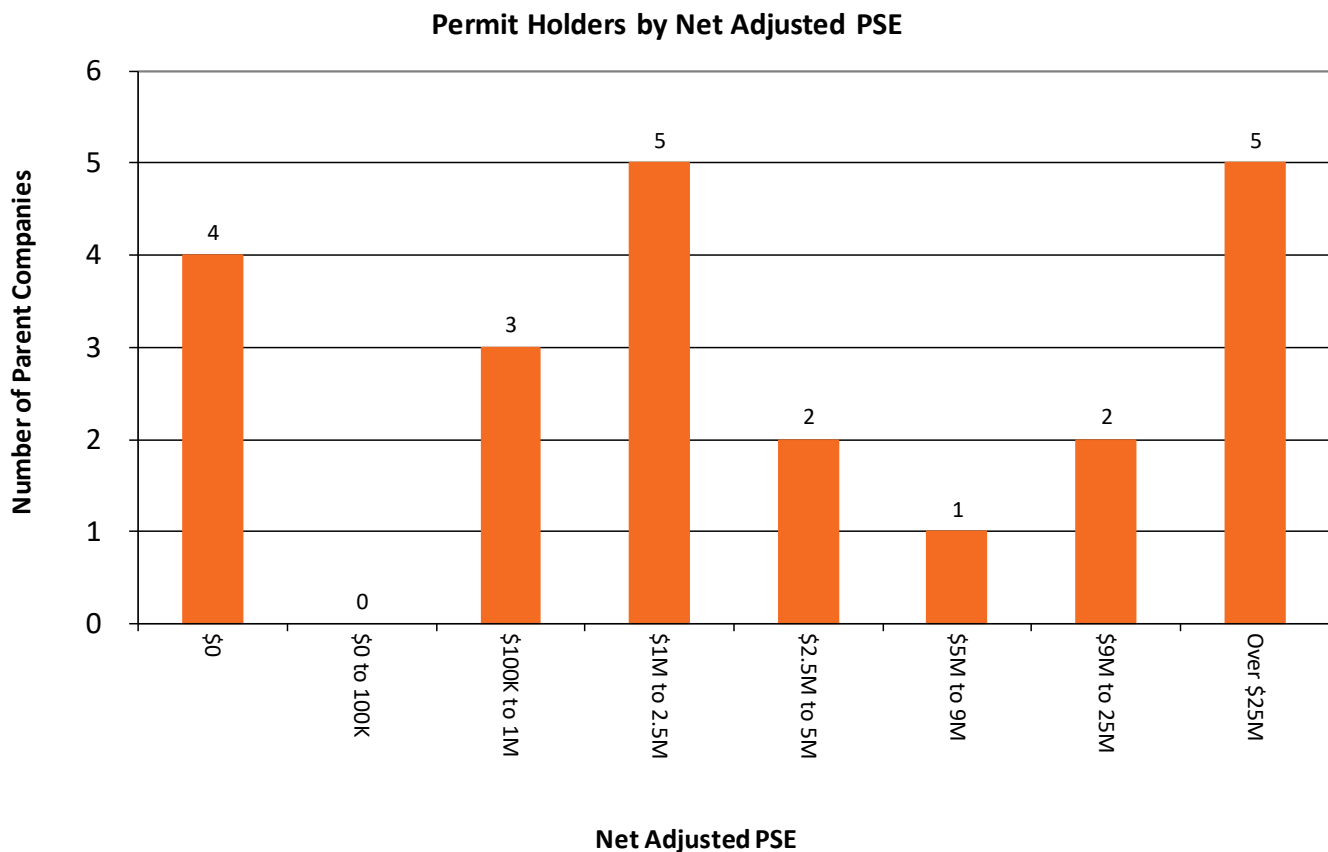
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understand that the Fund still could have some potential liability, if the provider of the performance security should become insolvent prior to fulfilling its obligation. This situation occurred on a number of forfeited sites in Ohio in the early 2000s. We also note that the excess of individual permit performance security over the Performance Security Estimate has not been used as an offset to total Fund liabilities, as these monies would not be available to cover other forfeitures.

Estimated Potential Reclamation Fund Cost by Permit Holder

Exhibits 7.1a, 7.1b, and 7.1c provide the estimate of the potential reclamation cost by permit holder. Four permit holders (operators) only have permits with zero net liability to the Fund. In essence, these operators are privately secured at “full cost”. Therefore, 18 of the 22 current permit holders (operators) pose potential liability to the Fund (assuming their performance security providers do not fail).



The average potential cost of a permit holder forfeiture of the operators and sites is over \$30.3 million per operator (\$544.8 million divided by 18 operators with exposure to the Fund). As can be seen in Exhibit 7.1b, the five largest operators exceed the average. We do note that the estimated potential Fund cost for each of the

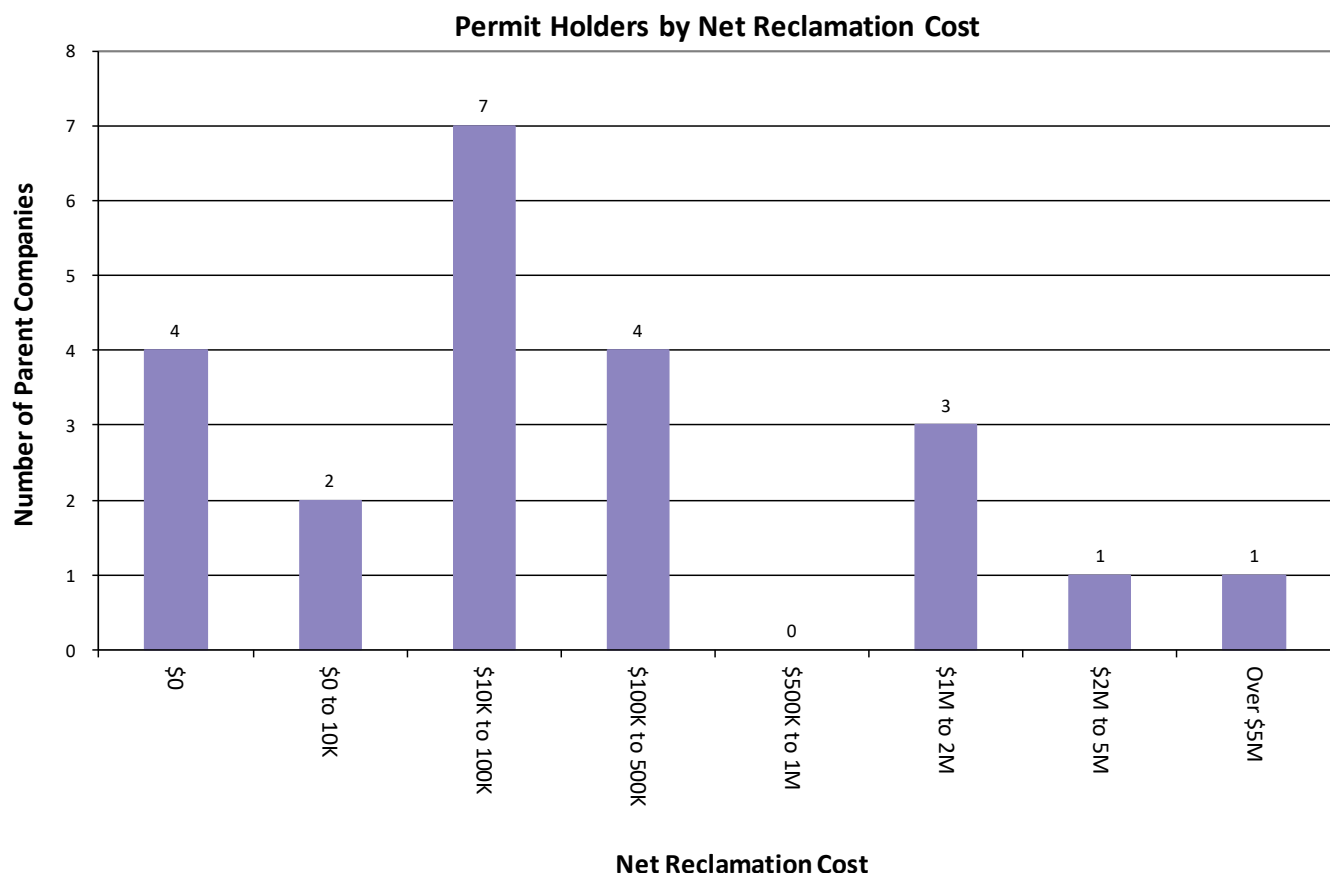
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other 13 operators is well below the average of \$30.3 million. In fact, the average potential Fund cost of these 13 operators is \$3.98 million. We can conclude that the greatest concentration of risk to the Fund comes from a small number of mine operators.

Comparing the potential cost as obtained from the engineers at the ODNR-DMRM and adjusted for the available performance security with the number of permits with potential cost to the Fund, we develop the average potential cost (PSE per permit) of a forfeited permit of approximately \$4.95 million (\$544.8 million divided by the 110 permits with potential liability to the Fund). Please see Exhibit 4.3.

As can be seen, the estimated expected Fund cost (Net Reclamation Cost) at the permit holder level for those permits in the study is significantly less than the estimated potential Fund cost (Net Adjusted PSE) from the permit holder forfeiture. Please see the charts below and Exhibits 7.1a and 7.1b for comparisons. The difference in these figures can be thought of as being similar to the difference between the insured value of a home (potential cost) and the annual premium to insure the home against a multitude of potential losses over the many years of occupancy (expected cost).



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Based upon the information in the ODNR-DMRM data base (CTS) for each site within each of the three phases, we have allocated the total estimated reclamation cost to the three reclamation phases. This step is necessary to reflect the differences in the estimated time until full release of the permit and the associated performance security based upon the assigned phase. These time estimates were developed based upon data from a report by the Office of Surface Mining Reclamation and Enforcement that is titled “A Report on the Success of Achieving Reclamation Standards on Surface Coal Mining Operations in Ohio,” as well as internal calculations from the DNR for the most recent years presented. Please see Exhibit 3.2. As with any estimates, some sites may operate within significantly longer or shorter time periods – especially the active permits:

- For active permits (those without Final Maps), we have assumed that the future life cycle will take 21 years to completely proceed through the various phases of mining operation from coal extraction to land replacement, removal of collection ponds, replanting and reforestation and the maintenance period required to assure that the land is stable and fulfills the requirements of the approved reclamation plan and final release of the permits. At the point of permit release, the exposure to the Fund declines to zero and the private performance security is also fully released.
- For permits with Final Maps and CTS data pending phase 1 release, we assume that phase 1 release will be reached in 3 years. The additional time to release follows the phase 2 and phase 3 timeframes below.
- For permits with Final Maps and CTS data pending phase 2 release, we assume that phase 2 release will be reached in 6 years. The additional time to release follows the phase 3 timeframe below.
- For permits with Final Maps and CTS data pending phase 3 release, we assume that full release will be reached in 8 years.

The \$544.8 million in potential cost from the permits in the study are spread across the Active and Final Map Permits within the three phases of reclamation as follows:

- | | |
|-----------------------------|-----------------|
| • Active Pending Phase 1 | \$318.2 million |
| • Active Pending Phase 2 | \$57.9 million |
| • Active Pending Phase 3 | \$46.7 million |
| • Final Map Pending Phase 1 | \$115.9 million |
| • Final Map Pending Phase 2 | \$5.81 million |
| • Final Map Pending Phase 3 | \$0.24 million |

Please see Exhibit 4.2. These figures have significance as the permits now fully contained in phases 1, 2 and 3 of reclamation are no longer contributing revenue to the Fund but will continue to expose the Fund to potential cost. Please note that all potential costs are accumulated in the first category with any current activity. Thus, a permit with a final map pending phase 1 may also have some acres in pending phases 2 and 3 of the reclamation process, but all potential costs from the phase 2 or 3 acres would be included in the pending phase 1 category shown above.

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Analysis of the Reclamation Forfeiture Fund

Estimated Operator Financial Strength – Potential for Future Default

Since the Fund will only be called upon to financially support a reclamation effort if the permit holder should no longer have the financial resources to complete the effort, we need to consider the probability of forfeiture or financial default of the permit holder/operator. To reflect this potential financial incapacity of the permit holder in our analysis, we have developed average forfeiture probabilities based on Ohio forfeiture data and the forfeiture rates in Kentucky and West Virginia. Please see Exhibit 5.2.

Projection into the Future

The time horizon for potential forfeiture varies based upon the reclamation phase determined by the ODNR-DMRM. For the active permits, we used the longest period available – 21 years for the period of time from current until the reclamation is completed and the permit is released. For the sections of the permits with Final Maps currently working to achieve phase 1 release, we used a shorter period of 17 years to reflect that coal extraction has ceased and reclamation is underway. For the sections of permits currently in process of achieving phase 2 release, we used a 14 year time horizon and for the sections of permits currently within the maintenance period prior to phase 3 and total permit release, we have used 8 years as the appropriate time horizon. Please note that the underlying exposure (cost of reclamation) to the Fund declines when a section moves from one phase to the next in the same fashion as the release of the private performance security declines.

Impact of Future Inflation and Present Value of Estimate

As in our previous reports, we include an explicit consideration of future inflation on reclamation costs (materials, fuel and manpower). We also explicitly consider that the costs of future potential liabilities could be discounted to present value based upon expected investment returns. That is - “how much money is needed to be set aside today to cover the costs years into the future?”

In this analysis, we make a separate reclamation cost inflation adjustment that varies by year. The following table displays the inflation rates utilized. These rates were provided by the RFFAB and were based on their internal analysis of costs and expected costs.

Reclamation Cost Inflation Rates	
Year	Rate
2019	0.00%
2020	0.00%
2021	3.00%
2022	3.00%
2023	3.50%
2024	3.50%
2025 & Subs	4.00%

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We also use the investment rates to discount the future costs to present value. The rates are based upon United States Treasury Note return rates as of February 6, 2019. The Treasury Notes are sold for 1, 2, 3, 5, 7, 10, 20 and 30 year investment periods. The final selections reflect the recent returns experienced by the Fund. After discussing likely investment returns with the RFFAB, we determined to lengthen the time period it will take the Fund to move to the more favorable return rates projected by the Treasury. We have interpolated the years in between those available. When investment returns are less than the assumed reclamation cost rates at any one point in time, the Fund liabilities are adversely impacted by cost inflation. Please see Exhibit 8 for a display of the rate of investment returns used in our analysis.

Development of the Estimates of Expected Cost

We develop estimates of the expected cost for each permit by combining the potential cost to the Fund information with the probabilities of forfeiture by permit age over the entire exposure period based upon the current distribution by phase. These forfeiture rates are adjusted to reflect the phase of the mine. The probability of forfeiture declines as the reclamation process transitions from active mining to reclamation and on to final release. Please see Exhibit 5.3. These expected long run average cost estimates by permit are then summed by parent company and then for the Fund in total. In this case, \$19.4 million is the estimated long run average expected cost for land reclamation. Exhibit 2.2 summarizes the estimated costs over the next 24 years.

Estimated Expected Cost by Larger Permit Holders

There are a number of sites that would be potentially impacted by a single large company becoming financially troubled. We have also developed estimates by permit holder as well as individual permit. Again, we are reflecting the assumption that if a permit holder should forfeit one permit, then all permits for that entity would simultaneously be forfeited.

Thus, in the case of the forfeiture risk borne by the Fund, there is significant correlation between the default probabilities of various permits. On the other hand, we note that no adjustment is made for any spread of risk between the various permit holders as the concentration of risk is much more significant. One might also look at it from the other perspective, i.e., if the larger permit holders continue to remain solid financially, the potential reclamation costs to the Fund might be much more manageable.

In Exhibit 7.1b, we provide the estimated nominal expected costs for the top five permit holders in terms of total expected cost to the Fund before application of reclamation cost inflation or present value calculations.

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Impact of Land Reclamation Cost Inflation and Adjustment to Present Value

We adjust the 2019 nominal estimates to reflect the expected future reclamation cost inflation using the annual rates displayed in a previous table. These figures are then returned to a 2019 present value basis through the use of selected investment rates as previously displayed. Please see Exhibit 2.2 for the results. The following chart shows a summary of the impact of these adjustments to the estimates.

Estimated <i>EXPECTED</i> Land Reclamation Fund Cost <i>*After Cost Inflation and Present Value Adjustment*</i>		
	Gross of Bond	Net of Bond
Nominal Estimate	\$20,481,945	\$19,324,728
Impact of Reclamation Cost Inflation	4,236,642	3,966,073
Present Value Adjustment	(4,190,418)	(3,924,329)
Resulting PV Estimate	\$20,528,169	\$19,366,472

Cost of Forfeited Sites Currently in the Reclamation Forfeiture Fund

An additional step is required when reviewing the financial condition of the Fund. We need to account for the sites included in the inventory of forfeited permits that are currently the responsibility of the Fund. As of December 31, 2010, all reclamation projects of previously forfeited permits had been substantially completed. However, the cost of the recent Valley Mining forfeitures has an impact on the analysis too.

The RFFAB has estimated the cost of the Valley Mining forfeitures will be paid out at a rate of \$2.22 million and \$0.72 million over the next two years (design and construction costs combined).

Potential Cost to the Fund from Bond Company Default

Since the Fund would be responsible for the full cost of reclamation of forfeited sites in the case of an insolvency of a performance security provider, we have attempted to roughly estimate the potential long term cost of this exposure to the Fund. As this has already happened in the past with a number of sites reclaimed by the Fund, this possibility of concurrent permit forfeiture and insurer insolvency is clearly a valid concern. In order for the Fund to be obligated to provide reclamation coverage, there would need to be forfeiture by the permit holder and an insolvency of the bonding company for that permit holder. Bond amounts and account numbers are verified by the bonding company and by the ODNR-DMRM every five years at renewal.

Typically, the performance security provided by the bonding company carries an annual premium for coverage that is irrevocable - even for non-payment of premium. The Fund's exposure to insurer insolvency is typically contained within a period of roughly 12 months rather than across the full life of the permit. The Fund management can require the replacement of a performance security provider in the event of an insurer's

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insolvency. The Ohio Revised Code allows up to 12 months for the operator to replace the coverage provided by an insolvent surety.

Other alternative financial arrangements do not carry a significant default risk. The following summarizes some of the underlying structure of those programs:

- Irrevocable Letters of Credit (LOC) must be issued for a term of 12 months or more and intent to non-renew requires 60-day notice to the ODNR-DMRM. Verification of validity prior to the expiration date of the LOC and value of the LOC is conducted annually by the ODNR-DMRM.
- Certificates of Deposit are automatically renewable and held at the Treasurer of the State's office. The amount of required security is verified annually at maturity. The Treasurer's office reports to the ODNR-DMRM on any issues monthly.
- Cash is held by the Treasurer of State in a separate fund.

If we assume the probability of forfeiture by a permit operator in any one year is the same as selected for our analysis (0.50% in Exhibit 5.2) and the probability of the insolvency of a performance security provider is equal to the three year average default rate in 2017 for US financial institutions and insurance providers (1.51 percent) based on a recent Standard & Poor's study, the combined probability of default of both the permit holder and the provider of performance security is 0.50 percent times 1.51 percent, or 0.00755 percent. When applied to the estimated performance security of the sites included in the study as provided in the CTS files (\$544.8 million), we develop an annual expected cost of \$41,100. This expected cost does not appear to be material to the total Fund expected cost.

But it should be noted that, as has actually been previously witnessed, in the event of the situation where both the permit holder AND the performance security provider are unable to meet their obligations with respect to the completion of the reclamation, the actual cost of a provider of performance security to the Fund can be significant and material.

Reclamation Forfeiture Fund Operating Expenses

Reclamation Forfeiture Fund operating expenses include various oversight services provided by ODNR-DMRM personnel, travel cost reimbursements of Advisory Board members, external consulting costs, etc. The ODNR-DMRM booked operating expenses of \$5,693 for Fund 5310/Reclamation Forfeiture for Fiscal Year 2018, and has booked \$74,961 to the Fund through June 21, 2019 for Fiscal Year 2019.

The PSEs that we used to develop our future cost of reclamation estimates already include a 15% mark up for administrative expenses. For our estimates, we have assumed annual expenses of \$5,000 for overhead costs not included in the PSEs, a biennial actuarial study at \$60,000 per study, spread over two years, and long-term water treatment administrative expense of \$10,000. (It should be noted that even though long-term water treatment trusts include operating expenses, our determination of the water treatment costs described below

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Analysis of the Reclamation Forfeiture Fund

are not based on ODNR-DMRM cost estimates. We therefore add this additional expense in.) Our estimate therefore assumes the need for a periodic update to this type of analysis, annual water treatment administrative expense, and the need for the Advisory Board to meet periodically to discuss critical issues related to the financial operation of the Fund.

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Analysis of the Reclamation Forfeiture Fund

LONG-TERM WATER TREATMENT AND ALTERNATIVE WATER SUPPLY

Currently there are three permits determined by ODNR-DMRM to require long-term water treatment. The ODNR-DMRM is monitoring another two permitted sites for potential long-term water treatment. The list of monitored sites is continually being updated as new information becomes available. See Exhibits 9.2a and 9.2b for the current listing of sites designated for water treatment or monitoring.

There is limited data on how these potential long-term water treatment sites might develop. In order to determine an estimated liability on current permits, we considered the limited data available in Ohio along with the somewhat broader data base available from our analysis of West Virginia water reclamation liabilities.

In our first approach we consider the average costs per permitted acre separately for water treatment and capital cost (including cost of set up, annual maintenance and abandonment). We developed averages for the Ohio Consol permit and another set of averages based on West Virginia data. The data for the one Ohio permit does not contain sufficient information to make use of our intended exposure measure of permitted acres. (Consol is showing the footprint of acres rather than the permitted number of acres, which may be different than our intended measure.) Since we only have this one data point for Ohio, we selected the West Virginia cost indications to use in our estimates for Ohio

We also developed an estimate of permitted acres that will be in future need of long-term water treatment. That estimate is the sum of current permitted acres designated for long-term water treatment and a portion of monitored permitted acres. Our initial estimate of the portion of monitored permitted acres that will become treated permitted acres has been set at 5%. There is limited data to estimate how many of the monitored sites will become treatment sites. The 5% estimate was predicated on judgment per our discussions with the ODNR-DMRM.

The ODNR-DMRM selected a 75 year time horizon to estimate future costs. Treatment could be required for an even longer time period, but for practical reasons the ODNR-DMRM established 75 years as their best management decision to account for these types of claims as they surface.

The final piece of the first estimate is to determine a forfeiture rate. There is only a liability to the Fund if the permit is forfeited. We have already selected a 0.50% annual forfeiture rate for all permits in Ohio. That annual forfeiture rate was developed from Ohio, Kentucky and West Virginia lifetime forfeiture rates. We have also selected a lifetime forfeiture rate of 0.50% for permits involving water. Again, there is no data to develop statistical estimates. In discussions with the Board, we conclude that the same rate applied to land forfeitures is appropriate for water forfeitures.

Our first method of estimating the ultimate liability for long-term water treatment on current permits is then simply the product of the number of permitted acres, the average cost per permitted acre, the number of years

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for payment, and the probability a forfeiture will occur. This method yielded a long-term water cost of \$160,747.

Our second estimate utilizes the estimated water treatment cost for the full cost permit #201501. We developed a permit count ratio of permits with water concerns (treatment and monitoring) to total number of permits in the Fund. The actual ratio is approximately 4%. We select a projected ratio of 5%. Applying the 5% ratio to the cost for permit #201501 (\$1.84 million) produces our second estimate for long-term water treatment liabilities of \$92,142.

Based upon these two estimates, we selected a final estimate of \$500,000. Our selection of \$500,000 is the same as we selected in our 2017 analysis and substantially lower than our selection in our 2015 analysis of \$2.25 million. We feel the \$500,000 selection is still appropriate given the minimal amount of activity in setting up water treatment trusts, the monitoring of potential water sites, and the outlook for the need of future trust funds.

We make a final adjustment to the estimate to account for underlying security, primarily in the form of standby trust funds. While these funds are to be set up to cover 100% of the cost of capital and treatment, the operator can spread the funding of standby trusts over five years. In the meantime, the Reclamation Forfeiture Fund provides the remainder of the coverage. The one trust that has already been established is fully funded and presents no liability to the Fund since the trust has a built in mechanism to adjust for shortages over time. Of course, not all permits needing standby trust funds will necessarily have established a trust fund before a forfeiture occurs. In fact, the discovery of the need for water treatment could escalate the probability of forfeiture for permits owned by operators already in economic distress. We selected a 10% credit adjustment factor to apply to our water liability estimate. This 10% adjustment is based on judgment, considering the limited number of trusts that have previously been established. We may need to increase the credit with time if more of these trusts actually become reality.

Applying the 10% mitigating water trust adjustment factor estimate to the selected \$500,000 estimated expected costs results in a net \$450,000 estimate for long-term water treatment and alternative water supply liabilities. See Exhibit 9.1. As the underlying data for our calculations is very limited and the assumptions made to determine the estimated costs are open to a large range of variation, it is important to note here that final results could in fact deviate substantially from these estimates. The ODNR-DMRM will want to monitor this aspect of the Fund's liability closely and update these estimates as often as practical.

Please note that the above figures for long term water treatment are stated on a basis before inflation and present value are taken into account over the 75 year payout period. After consideration of inflation and present value, the estimated expected cost of \$450,000 becomes \$645,823. See Exhibit 2.3.

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Analysis of the Reclamation Forfeiture Fund

FINANCIAL CAPACITY OF THE FUND

The capital available to operate the Fund is generated from revenues from the severance tax on the covered permit holders based upon their coal production. As explained in other sections of the report, this revenue is not directly related to the liability assumed / forfeiture protection provided by the Fund to the operators nor does it reflect the different financial capacity of each permit holder to fulfill his obligations to complete the land reclamation process. As opposed to an up-front premium payment required by the providers of the underlying private performance security (often to provide security over a single year time horizon) as is provided on “full cost” permits, Ohio’s alternative bonding system is comprised of a per acre bond plus a severance tax charged to operators to build capital on an as-you-go basis. The collections from today need to cover the exposure that exists currently from both active mining sites and sites in the process of reclamation as well as potentially provide some additional capital accumulation to cover the current sites in the future.

The dynamic nature of the process whereby portions of the permitted sites move from active mining to phase 1 reclamation to phase 2 reclamation to phase 3 reclamation over time adds a complicating feature to any analysis or comparison of future revenue with either future expected costs. Any increase in mining operations will result in both an increase in revenue and an increase in potential future cost to the Fund. Similarly, declines in mining operations will result in decreased revenue and decreased exposure to the Fund. Since the Fund retains responsibility for forfeited reclamation projects in the years following the cessation of mining operations, the financial exposure to the Fund remains for a number of years after the revenue to the Fund has ceased.

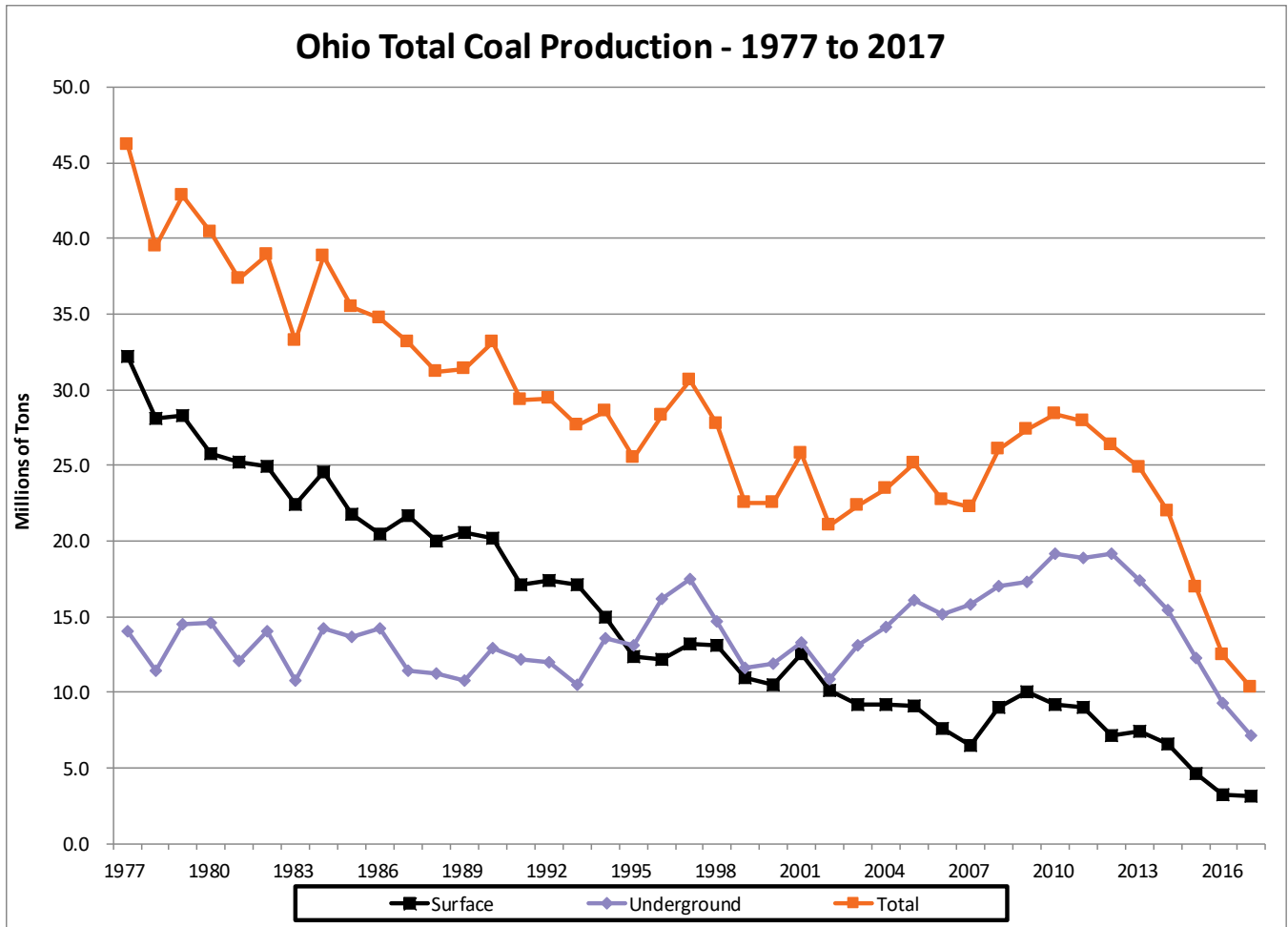
Future Coal Production Projection

Based upon historical coal production figures developed by the Ohio Department of Natural Resources, Division of Geological Survey and provided for our use by the Ohio Department of Natural Resources, we have the historical coal production from surface mining operations and underground mining operations. In the prior review, we used this data to attempt to project coal production into the future and thus the severance tax revenues.

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Analysis of the Reclamation Forfeiture Fund

The following chart displays the historical coal production in Ohio.



In our work on another project, we became aware of the “Consensus Coal Production Forecast Report for West Virginia 2017”. This report was prepared for the West Virginia Department of Environmental Protection by Christine Rish, Alicia K. Copley, and Jacqueline Agesa. While this projection is specifically tailored to coal mining in West Virginia, it utilizes economic assumptions with respect to supply and demand related specifically to Northern Appalachia coal. We have developed a projected future annual change in Ohio coal production based upon the changes forecast in Northern Appalachian coal in the Energy Information Administration Annual Energy Outlook 2019 and a study performed by Energy Ventures. We also relied upon the recommendations from the ODNR-DMRM.

Ohio Department of Natural Resources
Analysis of the Reclamation Forfeiture Fund

COAL PRODUCTION INDEX					
NORTHERN APPALACHIA COAL PRODUCTION					
Year	Energy Information Admin.		Energy Ventures Analysis		Pinnacle Selected
	Tons (in millions)	Index to 2017	Short Tons Per Miner Hour	Index to 2017	Index to 2017
2017	112.73	1.0000	4.32	1.0000	1.0000
2018	129.1	1.1453	4.13	0.9560	1.1264
2019	114.0	1.0109	3.94	0.9120	1.0011
2020	100.7	0.8931	3.75	0.8681	0.8906
2021	84.4	0.7491	3.66	0.8472	0.7589
2022	88.8	0.7878	3.58	0.8287	0.7919
2023	91.4	0.8106	3.49	0.8079	0.8103
2024	89.7	0.7956	3.41	0.7894	0.7950
2025	90.6	0.8041	3.32	0.7685	0.8005
2026	89.7	0.7953	3.24	0.7500	0.7908
2027	88.6	0.7859	3.16	0.7315	0.7805
2028	88.7	0.7864	3.07	0.7106	0.7789
2029	90.0	0.7987	2.99	0.6921	0.7881
2030	87.8	0.7785	2.91	0.6736	0.7680
2031	89.2	0.7909	2.85	0.6597	0.7778
2032	86.3	0.7659	2.78	0.6435	0.7537
2033	87.1	0.7725	2.72	0.6296	0.7582
2034	85.2	0.7555	2.66	0.6157	0.7415
2035	86.2	0.7650	2.60	0.6019	0.7486
2036	87.2	0.7733	2.53	0.5856	0.7545
2037	88.3	0.7834	2.47	0.5718	0.7622
2038	89.5	0.7941	2.41	0.5579	0.7705
2039	89.3	0.7924	2.34	0.5417	0.7673
2040	90.1	0.7995	2.28	0.5278	0.7724
2041	91.1	0.8082	2.24	0.5185	0.7793
2042	90.8	0.8057	2.20	0.5093	0.7761
2043	91.8	0.8141	2.16	0.5000	0.7826
2044	91.7	0.8132	2.12	0.4907	0.7810
2045	91.2	0.8086	2.08	0.4815	0.7759
2046	90.4	0.8021	2.04	0.4722	0.7691
2047	89.8	0.7965	2.00	0.4630	0.7632
2048	89.2	0.7914	1.96	0.4537	0.7576
2049	87.4	0.7752	1.92	0.4444	0.7422
2050	86.8	0.7703	1.88	0.4352	0.7368

Ohio Department of Natural Resources

Analysis of the Reclamation Forfeiture Fund

We have used the average index to develop a projection of future Ohio coal production. In 2017, there were 10.3 million tons of coal mined in the state of Ohio, of which we attribute 9.2 million tons to operations that participate in the Fund. Based upon the methodology described above, the following table provides the projected future coal production in Ohio for operations under the Fund. It should be noted that the tonnage listed in the table below is a formula projection based on the assumption in the above table. The projections below are on a calendar year basis. Differences are possible if coal production is summarized on a fiscal year basis. Actual results may vary significantly from the projections listed below.

Ohio RFF Coal Production Projections (in million tons)		
Year	Avg. Index	Tons
2018	1.1264	10.4
2019	1.0011	9.2
2020	0.8906	8.2
2021	0.7589	7.0
2022	0.7919	7.3
2023	0.8103	7.5
2024	0.7950	7.3
2025	0.8005	7.4
2026	0.7908	7.3
2027	0.7805	7.2
2028	0.7789	7.2
2029	0.7881	7.3
2030	0.7680	7.1
2031	0.7778	7.2
2032	0.7537	6.9
2033	0.7582	7.0
2034	0.7415	6.8
2035	0.7486	6.9
2036	0.7545	6.9
2037	0.7622	7.0
2038	0.7705	7.1
2039	0.7673	7.1
2040	0.7724	7.1
2041	0.7793	7.2
2042	0.7761	7.1

As in our prior analysis, we feel that this projection is more predictive of the future than the use of an exponential trend of past Ohio coal production.

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Analysis of the Reclamation Forfeiture Fund

We caveat these estimates by stating that we assume the demand for coal from Ohio's mines will follow those projected in West Virginia for Northern Appalachia / Steam Coal. These assumptions are less certain the further out in the time horizon one goes. Another important assumption is that the supply of coal is more or less unlimited and thus the revenue to the Fund is not constrained or limited over the time horizon.

The per ton based severance tax rate is predicated upon the Fund balance from the prior year-end according to the following chart:

Fund Balance	Rate per Ton of Coal
Less than \$5 Million	\$0.16
Between \$5 and \$10 Million	\$0.14
In excess of \$10 Million	\$0.12

The levels of estimated production along with the severance tax rates would generate between \$0.72 million and \$1.68 million in annual operating capital for the Fund. We understand that currently about 90 percent of the current coal extraction is from Fund covered permits and have adjusted our revenue projections to account for this fact.

Based upon the various projections of future coal production provided, we have developed the following table that displays the estimated revenue from the severance tax that would be generated by these production levels with the added assumption that 90% of the coal production is from operators participating in the Fund. We provide the estimates at the three tax rates currently included in the statute.

OHIO RECLAMATION FORFEITURE FUND ANALYSIS			
Potential Reclamation Fund Revenue Projection			
Tons (in millions)	\$0.12	\$0.14	\$0.16
6.0	\$720,000	\$840,000	\$960,000
6.5	780,000	910,000	1,040,000
7.0	840,000	980,000	1,120,000
7.5	900,000	1,050,000	1,200,000
8.0	960,000	1,120,000	1,280,000
8.5	1,020,000	1,190,000	1,360,000
9.0	1,080,000	1,260,000	1,440,000
9.5	1,140,000	1,330,000	1,520,000
10.0	1,200,000	1,400,000	1,600,000
10.5	1,260,000	1,470,000	1,680,000

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Analysis of the Reclamation Forfeiture Fund

Current Fund Balance

The Fund is in the process of collecting the revenue to build up sufficient capital to provide for future potential reclamation projects. The balance in the Fund as of May 2013 was approximately \$16.3 million. This capital increased \$8.1 million from the December 2010 balance of \$8.2 million.

We note that since June 2010, current reclamation work had been substantially completed on forfeited sites. Thus, a grand majority of the severance tax has been added to the Fund. The Fund balance at the end of December 2014 had risen to \$21.4 million. The balance increased to an amount of \$25.9 million as of November 2016, and has dropped slightly to \$22.2 million as of December 31, 2018. It is this latter figure that is used to begin our cash flow analysis in Exhibit 1.

Investment Rate of Return

In addition to the revenue received from the severance tax, the capital funds will be invested by the State Treasurer in conservative instruments. We note that the Fund's capital is invested along with all of the other State investments and the returns are allocated back to the Reclamation Forfeiture Fund's account. This investment income opportunity should be included in the projection of possible Fund financial levels.

Based upon the current investment situation, we have assumed that the current returns are slightly less than those seen more historically. The investment rates are based upon recent US Treasury Note return rates. The Treasury Notes are sold for 1, 2, 3, 5, 7, 10, 20 and 30 year investment periods. We have interpolated the years between the years available. Please see Exhibit 8 for the resulting rates and discount factors used in our analysis.

Financial Picture – Current Permit Portfolio

One way to view the financial situation and outlook of a dynamic system is to review such an analysis on a current portfolio run-off basis. While we understand that at times the system has operated on an approach where the revenues of present sites have funded the reclamation of previously forfeited sites, our assignment included the task of measuring the current solvency of the Fund. In most analyses of this type, it is not appropriate to only reflect future income without a reflection of the additional potential liabilities. The current permit portfolio approach attempts to match the current capital and expected revenue from the current sites with the potential and expected costs or future liabilities from those same sites. This view eliminates the burden of the past being placed upon the future operations.

In this view, we review the financial picture of the system without the complication of adding any new entrants with respect to permits beyond those currently in the Fund as time goes forward. This view allows us to compare the current Fund Balance and estimated future revenue from only the permits currently in the Fund with the estimated expected costs for the same permits over a time horizon from current until all of the permits are anticipated to have completed phase 3 of the reclamation process.

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Analysis of the Reclamation Forfeiture Fund

The addition of new permits would add both revenue and potential cost to the system – estimating the impact of that dynamic would rely upon the information in the current analysis – thus not providing additional information. Again, as with any estimation of the future, there are many assumptions made and actual results may vary from the estimated expected results. In the case of the Fund, as is shown, these projected financial results can vary significantly and the differences can be very material.

In our estimation of the expected costs, we have assumed that the active mining operations continue fairly uniformly over a 7 year period of time. This is followed by a 6 year period pending phase 2 release and then an 8 year observation period pending phase 3 release. Any acreage pending phase 1 release with no associated mining is assumed to reach phase 1 release in 3 additional years. Because the probability of forfeiture varies based upon the number of years that we are projecting into the future, the expected cost to the Fund from a site will vary - even between years in the same phase of reclamation.

Exhibit 1 summarizes the revenues and costs associated with current permits that are expected to flow through the Fund through 2096. The tonnage fee revenue is based on the assumption of 2019 coal production of 9.2 million tons from the currently issued permits covered by the Fund, changing annually according to the Ohio RFF Coal Production table displayed above, and the associated revenue for the first six years. In the seventh and final year of assumed mining, we assume that coal extraction will be half of the indexed amount or 3.7 million tons from permits currently in-force.

We have credited the Fund with investment income on the prior year surplus – this assumes the current revenue is not invested until after the annual costs are paid. Also, investment income is constrained to not less than zero. The reclamation costs are the expected reclamation costs from Exhibit 2.1. Please note that we have assumed ongoing operating expenses to be \$5,000 to cover general overhead not included in the land reclamation cost estimates, and another \$10,000 for the next 75 years for water treatment expenses not already included in the water treatment reclamation costs.

As can be seen in Exhibit 1, our projections show that the recent Fund balance of \$22.2 million could continue decreasing over the next several years before gradually climbing back up to \$23.5 million in the next 78 years. This figure is on a present value basis, which is a relatively important consideration given the long time horizon associated with water treatment liabilities.

Alternative Approach

One other way of approaching the issue of capital and solvency would be to determine how many additional years with no permit holder forfeitures would be needed to generate sufficient capital to fund the reclamation of various permit holders. For purpose of explanation, we have developed these estimates at four levels based upon expected permit cost:

- the median permit holder,

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Analysis of the Reclamation Forfeiture Fund

- the average permit holder value,
- the 5th largest, and
- the largest permit holder.

With this approach, we have utilized the total annual coal production and assumed on-going operating expenses as described above and no on-going reclamation projects. Please see Exhibit 1 – Alternative for the details in the cash flow analysis.

Number of Years with No Forfeitures Needed to Accumulate Capital to Cover the Forfeiture of a Permit Holder		
Permit Holder Size	Net Adjusted PSE	Years from 2018
Median	2,198,194	0
Average	30,265,848	9
5th Largest	53,518,913	27
Largest	202,211,502	over 150

These estimates are before inclusion of otherwise expected land reclamation and water treatment liability. Making this adjustment would add several more years to the last three estimates in the table above.

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Analysis of the Reclamation Forfeiture Fund

ALTERNATIVE SCENARIOS

As noted in the **Executive Summary** section, we have endeavored to demonstrate the sensitivity of one of the key variables (i.e., forfeiture rate) on the indicated net total expenditures (Exhibit 2.1). At the Advisory Board's request, we have also measured the impact on the projected fund balance by calendar 2096 (Exhibit 1), if the Ohio legislature were to provide the Fund with various levels of additional capital contributions. The following tables present net total expenditures and fund balances for different combinations of forfeiture rates and capital contributions.

Net Total Expenditures:

OHIO RECLAMATION FORFEITURE FUND			
Net Total Expenditures (Exhibit 2.1)			
Based on Forfeiture Rate & Additional Capital Contribution			
Forfeiture Rate	Additional Capital Contributions		
	\$0	\$5M*	\$10M**
0.33%	\$16,128,111	\$16,128,111	\$16,128,111
0.50%	21,602,295	21,602,295	21,602,295
0.67%	27,076,479	27,076,479	27,076,479

Notes: * Reflects contribution on 7/1/2019
 ** Reflects contributions of \$5M each on 7/1/2019 and 7/1/2021

Fund Balance:

OHIO RECLAMATION FORFEITURE FUND			
Fund Balance at Calendar Year 2096 (Exhibit 1)			
Based on Forfeiture Rate & Additional Capital Contribution			
Forfeiture Rate	Additional Capital Contributions		
	\$0	\$5M*	\$10M**
0.33%	\$34,674,556	\$46,674,431	\$58,121,045
0.50%	23,530,172	35,530,047	46,976,661
0.67%	12,385,788	24,385,663	35,832,277

Notes: * Reflects contribution on 7/1/2019
 ** Reflects contributions of \$5M each on 7/1/2019 and 7/1/2021

The reader should observe that additional capital contributions do not have a direct impact on the aggregate level of expenditures.

**OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2019**

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Exhibit 1 Cash Flow (all figures discounted to present value)						
Calendar Year	Tonnage Fee	Interest Income	Land Reclamation	Water Reclamation	Operating Expense	Fund Balance
	(1)	(2)	(3)	(4)	(5)	(6)
2018						22,224,988
2019	1,091,000	575,603	2,221,592	0	35,000	21,635,000
2020	947,000	536,614	722,328	0	35,000	22,361,286
2021	787,000	534,554	0	0	35,000	23,647,839
2022	801,000	551,163	1,862,693	5,750	45,000	23,086,559
2023	800,000	525,158	1,876,317	5,792	45,000	22,484,609
2024	765,000	508,565	1,923,786	5,846	45,000	21,783,542
2025	375,500	483,777	1,831,716	5,912	45,000	20,760,192
2026	0	452,275	1,856,167	5,991	45,000	19,305,310
2027	0	414,355	1,880,395	6,069	45,000	17,788,201
2028	0	377,346	1,428,351	6,146	45,000	16,686,050
2029	0	347,145	743,852	6,222	45,000	16,238,121
2030	0	331,235	530,046	6,299	45,000	15,988,011
2031	0	318,563	461,134	6,375	45,000	15,794,065
2032	0	308,443	466,653	6,451	45,000	15,584,403
2033	0	298,226	472,146	6,527	45,000	15,358,955
2034	0	287,927	477,611	6,603	45,000	15,117,668
2035	0	277,566	159,443	6,678	45,000	15,184,113
2036	0	272,045	70,580	6,753	45,000	15,333,825
2037	0	268,970	71,362	6,828	45,000	15,479,604
2038	0	265,771	72,139	6,903	45,000	15,621,333
2039	0	262,456	58,612	6,976	45,000	15,773,200
2040	0	258,402	59,233	7,050	45,000	15,920,319
2041	0	255,129	59,849	7,124	45,000	16,063,476
2042	0	250,925	60,465	7,197	45,000	16,201,738
2043	0	247,481	0	7,270	10,000	16,431,949
2044	0	244,581	0	7,342	10,000	16,659,188
2045	0	242,386	0	7,414	10,000	16,884,160
2046	0	239,302	0	7,486	10,000	17,105,975
2047	0	236,907	0	7,558	10,000	17,325,325
2048	0	233,660	0	7,629	10,000	17,541,356
2049	0	230,141	0	7,718	10,000	17,753,779
2050	0	226,078	0	7,791	10,000	17,962,066
2051	0	222,004	0	7,864	10,000	18,166,206
2052	0	217,924	0	7,938	10,000	18,366,192
2053	0	213,843	0	8,013	10,000	18,562,022
2054	0	209,768	0	8,088	10,000	18,753,702
2055	0	205,701	0	8,165	10,000	18,941,238
2056	0	201,648	0	8,241	10,000	19,124,645
2057	0	197,613	0	8,319	10,000	19,303,939
2058	0	193,600	0	8,397	10,000	19,479,141
2059	0	189,611	0	8,476	10,000	19,650,276
2060	0	185,652	0	8,556	10,000	19,817,372
2061	0	181,724	0	8,637	10,000	19,980,460
2062	0	177,832	0	8,718	10,000	20,139,573
2063	0	173,976	0	8,800	10,000	20,294,749
2064	0	170,161	0	8,883	10,000	20,446,027
2065	0	166,388	0	8,967	10,000	20,593,448
2066	0	162,659	0	9,051	10,000	20,737,056
2067	0	158,976	0	9,136	10,000	20,876,896
2068	0	155,341	0	9,222	10,000	21,013,016
2069	0	151,756	0	9,309	10,000	21,145,463
2070	0	148,221	0	9,397	10,000	21,274,287
2071	0	144,739	0	9,485	10,000	21,399,541
2072	0	141,309	0	9,574	10,000	21,521,276

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2019

Exhibit 1 Cash Flow (all figures discounted to present value)						
Calendar Year	Tonnage Fee (1)	Interest Income (2)	Land Reclamation (3)	Water Reclamation (4)	Operating Expense (5)	Fund Balance (6)
2073	0	137,934	0	9,665	10,000	21,639,545
2074	0	134,613	0	9,756	10,000	21,754,403
2075	0	131,348	0	9,847	10,000	21,865,903
2076	0	128,138	0	9,940	10,000	21,974,101
2077	0	124,985	0	10,034	10,000	22,079,053
2078	0	121,889	0	10,128	10,000	22,180,814
2079	0	118,850	0	10,224	10,000	22,279,440
2080	0	115,867	0	10,320	10,000	22,374,988
2081	0	112,942	0	10,417	10,000	22,467,513
2082	0	110,074	0	10,515	10,000	22,557,072
2083	0	107,263	0	10,614	10,000	22,643,720
2084	0	104,508	0	10,714	10,000	22,727,514
2085	0	101,810	0	10,815	10,000	22,808,510
2086	0	99,168	0	10,917	10,000	22,886,761
2087	0	96,582	0	11,019	10,000	22,962,323
2088	0	94,051	0	11,123	10,000	23,035,251
2089	0	91,575	0	11,228	10,000	23,105,598
2090	0	89,153	0	11,334	10,000	23,173,418
2091	0	86,785	0	11,440	10,000	23,238,763
2092	0	84,471	0	11,548	10,000	23,301,686
2093	0	82,208	0	11,657	10,000	23,362,237
2094	0	79,998	0	11,766	10,000	23,420,469
2095	0	77,839	0	11,877	10,000	23,476,431
2096	0	75,730	0	11,989	10,000	23,530,172
Total	5,566,500	17,340,979	19,366,472	645,823	1,590,000	

Tonnage Fee	
Fund Balance	Rate
< \$5M	0.16
\$5M - \$10M	0.14
> \$10M	0.12

Footnotes:

- (1) All columns shown at present value, based on Exhibit 8, Investment Rates
 Based on coal production from the Ohio Department of Natural Resources, Division of Geological Survey.
 Future production based on the report "Annual Energy Outlook 2019 with projections to 2050" by the Energy Information Administration
 The per ton fee is predicated upon the prior year Fund Balance in column (6) according to the chart at the bottom of the second page, titled Tonnage Fee.
 Active mining continues for seven years, with the seventh year coal production being half the prior year. See Exhibit 3.1.
- (2) [Prior year Col (6) x Exhibit 8 Col (1)] + [Col (1) / 2 x Exhibit 8 Col (1)] x (1 + Exhibit 8 Col (3)). Years 2048 and subsequent based on 3.030% discount factor
- (3) Exhibit 2.1 Col (2).
- (4) Exhibit 2.1 Col (4).
- (5) Based on discussion with client. Inflation and discount rates assumed to offset.
 Majority of expense for land reclamation, based on 15% load in PSEs. Others include:
- | | | | | | |
|----------|---------|-----------------|----------|-----------------|----------|
| Overhead | \$5,000 | Actuarial/2 yrs | \$60,000 | Water Treatment | \$10,000 |
|----------|---------|-----------------|----------|-----------------|----------|
- (6) Year 2018 client provided data. Subsequent years = prior year col (6) + Col (1) + Col (2) - Col (3) - Col (4) - Col (5)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2019

Exhibit 1 - Alternative						
Cash Flow - Number of Years to Accumulate Capital to Cover a Forfeiture						
(all figures discounted to present value)						
Calendar Year	Tonnage Fee	Interest Income	Land Reclamation	Water Reclamation	Operating Expense	Fund Balance
	(1)	(2)	(3)	(4)	(5)	(6)
2018						22,224,988
2019	1,091,000	575,603	2,221,592	0	35,000	21,635,000
2020	947,000	536,614	722,328	0	35,000	22,361,286
2021	787,000	534,554	0	0	35,000	23,647,839
2022	801,000	551,163	0	0	45,000	24,955,002
2023	800,000	566,937	0	0	45,000	26,276,939
2024	765,000	592,907	0	0	45,000	27,589,845
2025	751,000	615,758	0	0	45,000	28,911,603
2026	723,000	637,735	0	0	45,000	30,227,338
2027	695,000	656,236	0	0	45,000	31,533,575
2028	676,000	676,101	0	0	45,000	32,840,675
2029	665,000	690,152	0	0	45,000	34,150,828
2030	631,000	703,064	0	0	45,000	35,439,892
2031	622,000	712,340	0	0	45,000	36,729,232
2032	587,000	723,019	0	0	45,000	37,994,251
2033	574,000	732,556	0	0	45,000	39,255,807
2034	546,000	741,029	0	0	45,000	40,497,836
2035	536,000	748,476	0	0	45,000	41,737,312
2036	526,000	752,496	0	0	45,000	42,970,808
2037	516,000	758,274	0	0	45,000	44,200,081
2038	507,000	763,229	0	0	45,000	45,425,310
2039	491,000	767,321	0	0	45,000	46,638,631
2040	480,000	767,981	0	0	45,000	47,841,613
2041	471,000	770,454	0	0	45,000	49,038,067
2042	455,000	769,569	0	0	45,000	50,217,636
2043	446,000	770,478	0	0	10,000	51,424,114
2044	432,000	768,637	0	0	10,000	52,614,750
2045	417,000	768,561	0	0	10,000	53,790,312
2046	401,000	765,220	0	0	10,000	54,946,532
2047	386,000	763,649	0	0	10,000	56,086,180
2048	372,000	758,920	0	0	10,000	57,207,100
2049	355,000	752,882	0	0	10,000	58,304,983
2050	342,000	744,638	0	0	10,000	59,381,621
2051	329,000	735,966	0	0	10,000	60,436,587
2052	317,000	726,905	0	0	10,000	61,470,492
2053	305,000	717,496	0	0	10,000	62,482,989
2054	294,000	707,775	0	0	10,000	63,474,764
2055	283,000	697,778	0	0	10,000	64,445,542
2056	273,000	687,539	0	0	10,000	65,396,082
2057	263,000	677,090	0	0	10,000	66,326,171
2058	253,000	666,455	0	0	10,000	67,235,626
2059	244,000	655,664	0	0	10,000	68,125,290
2060	235,000	644,745	0	0	10,000	68,995,035
2061	226,000	633,718	0	0	10,000	69,844,752
2062	218,000	622,608	0	0	10,000	70,675,360
2063	210,000	611,438	0	0	10,000	71,486,798
2064	202,000	600,226	0	0	10,000	72,279,025
2065	195,000	588,993	0	0	10,000	73,053,018
2066	188,000	577,757	0	0	10,000	73,808,775
2067	181,000	566,533	0	0	10,000	74,546,308
2068	174,000	555,334	0	0	10,000	75,265,642
2069	168,000	544,175	0	0	10,000	75,967,817
2070	162,000	533,073	0	0	10,000	76,652,890
2071	156,000	522,036	0	0	10,000	77,320,926
2072	150,000	511,075	0	0	10,000	77,972,001

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2019

Exhibit 1 - Alternative						
Cash Flow - Number of Years to Accumulate Capital to Cover a Forfeiture						
(all figures discounted to present value)						
Calendar Year	Tonnage Fee	Interest Income	Land Reclamation	Water Reclamation	Operating Expense	Fund Balance
	(1)	(2)	(3)	(4)	(5)	(6)
2073	145,000	500,202	0	0	10,000	78,607,202
2074	139,000	489,424	0	0	10,000	79,225,626
2075	134,000	478,749	0	0	10,000	79,828,376
2076	129,000	468,187	0	0	10,000	80,415,563
2077	125,000	457,747	0	0	10,000	80,988,310
2078	120,000	447,433	0	0	10,000	81,545,744
2079	116,000	437,251	0	0	10,000	82,088,994
2080	112,000	427,207	0	0	10,000	82,618,201
2081	108,000	417,304	0	0	10,000	83,133,505
2082	104,000	407,547	0	0	10,000	83,635,052
2083	100,000	397,936	0	0	10,000	84,122,988
2084	96,000	388,476	0	0	10,000	84,597,465
2085	93,000	379,170	0	0	10,000	85,059,635
2086	89,000	370,020	0	0	10,000	85,508,655
2087	86,000	361,027	0	0	10,000	85,945,682
2088	83,000	352,193	0	0	10,000	86,370,875
2089	80,000	343,520	0	0	10,000	86,784,395
2090	77,000	335,007	0	0	10,000	87,186,402
2091	74,000	326,655	0	0	10,000	87,577,057
2092	72,000	318,465	0	0	10,000	87,957,522
2093	69,000	310,436	0	0	10,000	88,326,958
2094	66,000	302,566	0	0	10,000	88,685,524
2095	64,000	294,857	0	0	10,000	89,034,381
2096	62,000	287,307	0	0	10,000	89,373,688
2162	5,000	44,440	0	0	10,000	98,832,914
2163	5,000	43,150	0	0	10,000	98,871,064
2164	5,000	41,897	0	0	10,000	98,907,962
2165	5,000	40,680	0	0	10,000	98,943,642
Total	27,676,000	54,266,574	2,943,920	0	2,280,000	

Tonnage Fee	
Fund Balance	Rate
< \$5M	0.16
\$5M - \$10M	0.14
> \$10M	0.12

Number of Years with No Forfeitures Needed to Accumulate Capital to Cover the Forfeiture of a Permit Holder		
Permit Holder Size	Net Adjusted PSE	Years from 2018
Median	2,198,194	0
Average	30,265,848	9
5th Largest	53,518,913	27
Largest	202,211,502	Over 150

Number of Years with No Forfeitures Needed to Accumulate Capital to Cover the Forfeiture of a Permit Holder and otherwise expected land and water reclamation costs		
Permit Holder Size	Net Adj. PSE + Rec. Costs	Years from 2018
Median	22,210,489	1
Average	50,278,144	25
5th Largest	73,531,208	48
Largest	222,223,797	Over 150

Footnotes:

- All columns shown at present value, based on Exhibit 8, Investment Rates
- (1) Based on coal production from the Ohio Department of Natural Resources, Division of Geological Survey.
Future production based on the report "Annual Energy Outlook 2019 with projections to 2050" by the Energy Information Administration
The per ton fee is predicated upon the prior year Fund Balance in column (6) according to the chart at the bottom of the second page, titled Tonnage Fee.
- (2) [Prior year Col (6) x Exhibit 8 Col (1)] + [Col (1) / 2 x Exhibit 8 Col (1)] x (1 + Exhibit 8 Col (3)). Years 2048 and subsequent based on 3.030% discount factor
- (3) Years 2019-2021 reflect permit number D-1015 payments.
- (4) Assume no losses
- (5) Based on discussion with client. Inflation and discount rates assumed to offset.
- (6) Year 2018 client provided data. Subsequent years = prior year col (6) + Col (1) + Col (2) - Col (3) - Col (4) - Col (5)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS

SPRING 2019

Exhibit 1 - Shock Loss						
Cash Flow - Shock Loss Scenario with a Maximum Land Reclamation Cost Per Year of \$3,500,000						
(all figures discounted to present value)						
Calendar Year	Tonnage Fee	Interest Income	Land Reclamation	Water Reclamation	Operating Expense	Fund Balance
	(1)	(2)	(3)	(4)	(5)	(6)
2018						22,224,988
2019	1,091,000	575,603	2,221,592	0	35,000	21,635,000
2020	947,000	536,614	722,328	0	35,000	22,361,286
2021	787,000	534,554	0	0	35,000	23,647,839
2022	801,000	551,163	3,500,000	5,750	45,000	21,449,252
2023	800,000	488,548	3,500,000	5,792	45,000	19,187,008
2024	765,000	435,226	3,500,000	5,846	45,000	16,836,389
2025	375,500	374,848	3,500,000	5,912	45,000	14,035,825
2026	0	305,780	3,500,000	5,991	45,000	10,790,615
2027	0	231,602	3,500,000	6,069	45,000	7,471,148
2028	0	158,488	3,500,000	6,146	45,000	4,078,490
2029	0	84,851	3,500,000	6,222	45,000	612,119
2030	0	12,486	3,500,000	6,299	45,000	(2,926,693)
2031	0	0	3,500,000	6,375	45,000	(6,478,068)
2032	0	0	3,500,000	6,451	45,000	(10,029,520)
2033	0	0	3,500,000	6,527	45,000	(13,581,047)
2034	0	0	3,500,000	6,603	45,000	(17,132,650)
2035	0	0	736,159	6,678	45,000	(17,920,488)
2036	0	0	70,580	6,753	45,000	(18,042,821)
2037	0	0	71,362	6,828	45,000	(18,166,012)
2038	0	0	72,139	6,903	45,000	(18,290,054)
2039	0	0	58,612	6,976	45,000	(18,400,643)
2040	0	0	59,233	7,050	45,000	(18,511,926)
2041	0	0	59,849	7,124	45,000	(18,623,899)
2042	0	0	60,465	7,197	45,000	(18,736,561)
2043	0	0	0	7,270	10,000	(18,753,830)
2044	0	0	0	7,342	10,000	(18,771,173)
2045	0	0	0	7,414	10,000	(18,788,587)
2046	0	0	0	7,486	10,000	(18,806,073)
2047	0	0	0	7,558	10,000	(18,823,631)
2048	0	0	0	7,629	10,000	(18,841,260)
2049	0	0	0	7,718	10,000	(18,858,978)
2050	0	0	0	7,791	10,000	(18,876,769)
2051	0	0	0	7,864	10,000	(18,894,633)
2052	0	0	0	7,938	10,000	(18,912,571)
2053	0	0	0	8,013	10,000	(18,930,584)
2054	0	0	0	8,088	10,000	(18,948,672)
2055	0	0	0	8,165	10,000	(18,966,837)
2056	0	0	0	8,241	10,000	(18,985,078)
2057	0	0	0	8,319	10,000	(19,003,397)
2058	0	0	0	8,397	10,000	(19,021,794)
2059	0	0	0	8,476	10,000	(19,040,271)
2060	0	0	0	8,556	10,000	(19,058,827)
2061	0	0	0	8,637	10,000	(19,077,463)
2062	0	0	0	8,718	10,000	(19,096,181)
2063	0	0	0	8,800	10,000	(19,114,982)
2064	0	0	0	8,883	10,000	(19,133,864)
2065	0	0	0	8,967	10,000	(19,152,831)
2066	0	0	0	9,051	10,000	(19,171,882)
2067	0	0	0	9,136	10,000	(19,191,018)
2068	0	0	0	9,222	10,000	(19,210,240)
2069	0	0	0	9,309	10,000	(19,229,550)
2070	0	0	0	9,397	10,000	(19,248,946)
2071	0	0	0	9,485	10,000	(19,268,431)
2072	0	0	0	9,574	10,000	(19,288,006)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS

SPRING 2019

Exhibit 1 - Shock Loss						
Cash Flow - Shock Loss Scenario with a Maximum Land Reclamation Cost Per Year of \$3,500,000						
(all figures discounted to present value)						
Calendar Year	Tonnage Fee	Interest Income	Land Reclamation	Water Reclamation	Operating Expense	Fund Balance
	(1)	(2)	(3)	(4)	(5)	(6)
2073	0	0	0	9,665	10,000	(19,307,670)
2074	0	0	0	9,756	10,000	(19,327,426)
2075	0	0	0	9,847	10,000	(19,347,273)
2076	0	0	0	9,940	10,000	(19,367,214)
2077	0	0	0	10,034	10,000	(19,387,247)
2078	0	0	0	10,128	10,000	(19,407,375)
2079	0	0	0	10,224	10,000	(19,427,599)
2080	0	0	0	10,320	10,000	(19,447,919)
2081	0	0	0	10,417	10,000	(19,468,336)
2082	0	0	0	10,515	10,000	(19,488,851)
2083	0	0	0	10,614	10,000	(19,509,465)
2084	0	0	0	10,714	10,000	(19,530,179)
2085	0	0	0	10,815	10,000	(19,550,994)
2086	0	0	0	10,917	10,000	(19,571,910)
2087	0	0	0	11,019	10,000	(19,592,930)
2088	0	0	0	11,123	10,000	(19,614,053)
2089	0	0	0	11,228	10,000	(19,635,281)
2090	0	0	0	11,334	10,000	(19,656,614)
2091	0	0	0	11,440	10,000	(19,678,055)
2092	0	0	0	11,548	10,000	(19,699,603)
2093	0	0	0	11,657	10,000	(19,721,259)
2094	0	0	0	11,766	10,000	(19,743,026)
2095	0	0	0	11,877	10,000	(19,764,903)
2096	0	0	0	11,989	10,000	(19,786,892)
Total	5,566,500	4,289,764	49,632,321	645,823	1,590,000	

Tonnage Fee	
Fund Balance	Rate
< \$5M	0.16
\$5M - \$10M	0.14
> \$10M	0.12

Footnotes:

- All columns shown at present value, based on Exhibit 8, Investment Rates
- (1) Based on coal production from the Ohio Department of Natural Resources, Division of Geological Survey.
Future production based on the report "Annual Energy Outlook 2019 with projections to 2050" by the Energy Information Administration
The per ton fee is predicated upon the prior year Fund Balance in column (6) according to the chart at the bottom of the second page, titled Tonnage Fee.
Active mining continues for seven years, with the seventh year coal production being half the prior year. See Exhibit 3.1.
- (2) [Prior year Col (6) x Exhibit 8 Col (1)] + [Col (1) / 2 x Exhibit 8 Col (1)] x (1 + Exhibit 8 Col (3)). Years 2048 and subsequent based on 3.030% discount factor
- (3) Exhibit 2.1 Col (2).
* A shock loss of \$30,265,848, derived in Exhibit 7.1b Col (3), with a maximum land reclamation cost of \$3,500,000 per year.
- (4) Exhibit 2.1 Col (4).
- (5) Based on discussion with client. Inflation and discount rates assumed to offset.
- (6) Year 2018 client provided data. Subsequent years = prior year col (6) + Col (1) + Col (2) - Col (3) - Col (4) - Col (5)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2019

Exhibit 2.1							
Total Expenditures							
Calendar Year	Land Reclamation		Water Reclamation		Operating Expense	Gross Total	Net Total
	Gross (1)	Net (2)	Gross (3)	Net (4)			
2018							
2019	2,221,592	2,221,592	0	0	35,000	2,256,592	2,256,592
2020	722,328	722,328	0	0	35,000	757,328	757,328
2021	0	0	0	0	35,000	35,000	35,000
2022	1,999,004	1,862,693	6,389	5,750	45,000	2,050,393	1,913,443
2023	2,013,789	1,876,317	6,436	5,792	45,000	2,065,225	1,927,109
2024	2,064,713	1,923,786	6,495	5,846	45,000	2,116,208	1,974,632
2025	1,966,047	1,831,716	6,569	5,912	45,000	2,017,616	1,882,627
2026	1,992,292	1,856,167	6,656	5,991	45,000	2,043,948	1,907,158
2027	2,018,297	1,880,395	6,743	6,069	45,000	2,070,040	1,931,464
2028	1,518,953	1,428,351	6,828	6,146	45,000	1,570,781	1,479,497
2029	796,774	743,852	6,914	6,222	45,000	848,688	795,075
2030	564,836	530,046	6,998	6,299	45,000	616,834	581,344
2031	490,926	461,134	7,084	6,375	45,000	543,009	512,509
2032	496,801	466,653	7,168	6,451	45,000	548,970	518,104
2033	502,650	472,146	7,253	6,527	45,000	554,902	523,674
2034	508,468	477,611	7,337	6,603	45,000	560,804	529,214
2035	172,768	159,443	7,420	6,678	45,000	225,188	211,121
2036	74,711	70,580	7,504	6,753	45,000	127,215	122,334
2037	75,539	71,362	7,587	6,828	45,000	128,126	123,191
2038	76,362	72,139	7,670	6,903	45,000	129,031	124,042
2039	61,851	58,612	7,752	6,976	45,000	114,603	110,589
2040	62,506	59,233	7,834	7,050	45,000	115,340	111,283
2041	63,156	59,849	7,915	7,124	45,000	116,071	111,973
2042	63,807	60,465	7,997	7,197	45,000	116,803	112,662
2043	0	0	8,077	7,270	10,000	18,077	17,270
2044	0	0	8,158	7,342	10,000	18,158	17,342
2045	0	0	8,238	7,414	10,000	18,238	17,414
2046	0	0	8,318	7,486	10,000	18,318	17,486
2047	0	0	8,397	7,558	10,000	18,397	17,558
2048	0	0	8,476	7,629	10,000	18,476	17,629
2049	0	0	8,576	7,718	10,000	18,576	17,718
2050	0	0	8,656	7,791	10,000	18,656	17,791
2051	0	0	8,738	7,864	10,000	18,738	17,864
2052	0	0	8,820	7,938	10,000	18,820	17,938
2053	0	0	8,903	8,013	10,000	18,903	18,013
2054	0	0	8,987	8,088	10,000	18,987	18,088
2055	0	0	9,072	8,165	10,000	19,072	18,165
2056	0	0	9,157	8,241	10,000	19,157	18,241
2057	0	0	9,243	8,319	10,000	19,243	18,319
2058	0	0	9,330	8,397	10,000	19,330	18,397
2059	0	0	9,418	8,476	10,000	19,418	18,476
2060	0	0	9,507	8,556	10,000	19,507	18,556
2061	0	0	9,596	8,637	10,000	19,596	18,637
2062	0	0	9,687	8,718	10,000	19,687	18,718
2063	0	0	9,778	8,800	10,000	19,778	18,800
2064	0	0	9,870	8,883	10,000	19,870	18,883
2065	0	0	9,963	8,967	10,000	19,963	18,967
2066	0	0	10,057	9,051	10,000	20,057	19,051
2067	0	0	10,151	9,136	10,000	20,151	19,136
2068	0	0	10,247	9,222	10,000	20,247	19,222
2069	0	0	10,343	9,309	10,000	20,343	19,309
2070	0	0	10,441	9,397	10,000	20,441	19,397
2071	0	0	10,539	9,485	10,000	20,539	19,485
2072	0	0	10,638	9,574	10,000	20,638	19,574

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
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Exhibit 2.1							
Total Expenditures							
Calendar Year	Land Reclamation		Water Reclamation		Operating Expense	Gross Total	Net Total
	Gross (1)	Net (2)	Gross (3)	Net (4)			
2073	0	0	10,738	9,665	10,000	20,738	19,665
2074	0	0	10,840	9,756	10,000	20,840	19,756
2075	0	0	10,942	9,847	10,000	20,942	19,847
2076	0	0	11,045	9,940	10,000	21,045	19,940
2077	0	0	11,149	10,034	10,000	21,149	20,034
2078	0	0	11,254	10,128	10,000	21,254	20,128
2079	0	0	11,359	10,224	10,000	21,359	20,224
2080	0	0	11,466	10,320	10,000	21,466	20,320
2081	0	0	11,574	10,417	10,000	21,574	20,417
2082	0	0	11,683	10,515	10,000	21,683	20,515
2083	0	0	11,793	10,614	10,000	21,793	20,614
2084	0	0	11,904	10,714	10,000	21,904	20,714
2085	0	0	12,016	10,815	10,000	22,016	20,815
2086	0	0	12,130	10,917	10,000	22,130	20,917
2087	0	0	12,244	11,019	10,000	22,244	21,019
2088	0	0	12,359	11,123	10,000	22,359	21,123
2089	0	0	12,475	11,228	10,000	22,475	21,228
2090	0	0	12,593	11,334	10,000	22,593	21,334
2091	0	0	12,711	11,440	10,000	22,711	21,440
2092	0	0	12,831	11,548	10,000	22,831	21,548
2093	0	0	12,952	11,657	10,000	22,952	21,657
2094	0	0	13,074	11,766	10,000	23,074	21,766
2095	0	0	13,197	11,877	10,000	23,197	21,877
2096	0	0	13,321	11,989	10,000	23,321	21,989
Total	20,528,169	19,366,472	717,581	645,823	1,590,000	22,835,750	21,602,295

Footnotes:

- | | | | |
|-----|---|-----|-----------------------------|
| (1) | Exhibit 2.2 Col (3). Inflated and discounted reclamation costs. | (5) | Client provided data |
| (2) | Exhibit 2.2 Col (6). Inflated and discounted reclamation costs. | (6) | Col (1) + Col (3) + Col (5) |
| (3) | Exhibit 2.3 Col (3). Inflated and discounted reclamation costs. | (7) | Col (2) + Col (4) + Col (5) |
| (4) | Exhibit 2.3 Col (6). Inflated and discounted reclamation costs. | | |

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
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Exhibit 2.2						
Land Reclamation Expenditures						
Calendar Year	Gross			Net		
	Expenditure	Inflated	Discounted	Expenditure	Inflated	Discounted
	(1)	(2)	(3)	(4)	(5)	(6)
2018						
2019	2,249,849	2,249,849	2,221,592	2,249,849	2,249,849	2,221,592
2020	749,950	749,950	722,328	749,950	749,950	722,328
2021	0	0	0	0	0	0
2022	2,085,947	2,180,515	1,999,004	1,943,707	2,031,826	1,862,693
2023	2,086,117	2,251,559	2,013,789	1,943,707	2,097,854	1,876,317
2024	2,119,237	2,367,361	2,064,713	1,974,589	2,205,778	1,923,786
2025	1,995,409	2,312,617	1,966,047	1,859,072	2,154,607	1,831,716
2026	1,995,409	2,405,122	1,992,292	1,859,072	2,240,791	1,856,167
2027	1,995,409	2,501,327	2,018,297	1,859,072	2,330,422	1,880,395
2028	1,482,956	1,933,304	1,518,953	1,394,502	1,817,988	1,428,351
2029	768,318	1,041,708	796,774	717,286	972,518	743,852
2030	538,064	758,704	564,836	504,923	711,973	530,046
2031	462,037	677,561	490,926	433,998	636,443	461,134
2032	462,037	704,663	496,801	433,998	661,901	466,653
2033	462,037	732,850	502,650	433,998	688,377	472,146
2034	462,037	762,164	508,468	433,998	715,912	477,611
2035	155,226	266,298	172,768	143,253	245,759	159,443
2036	66,377	118,428	74,711	62,706	111,879	70,580
2037	66,377	123,165	75,539	62,706	116,354	71,362
2038	66,377	128,091	76,362	62,706	121,009	72,139
2039	53,195	106,760	61,851	50,409	101,169	58,612
2040	53,195	111,030	62,506	50,409	105,216	59,233
2041	53,195	115,472	63,156	50,409	109,425	59,849
2042	53,195	120,090	63,807	50,409	113,802	60,465
2043	0	0	0	0	0	0
2044	0	0	0	0	0	0
Total	20,481,945	24,718,587	20,528,169	19,324,728	23,290,801	19,366,472

Footnotes:

(1)	See report for details. Years 2019-2021 reflect current reclamation projects. Payments for future forfeitures delayed by three years to reflect period between forfeiture order and reclamation activity.	(4)	See report for details Years 2019-2021 reflect current reclamation projects. Payments for future forfeitures delayed by three years to reflect period between forfeiture order and reclamation activity.
(2)	Col (1) x annual inflation of 0.0% for years 2019-20 3.0% for years 2021-22 3.5% for years 2023-24 4.0% for years 2025 & Subs	(5)	Col (4) x annual inflation of 0.0% for years 2019-20 3.0% for years 2021-22 3.5% for years 2023-24 4.0% for years 2025 & Subs
(3)	Col (2) + Col (2) x Exhibit 8 Col (3)	(6)	Col (5) + Col (5) x Exhibit 8 Col (3)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2019

Exhibit 2.3						
Water Reclamation Expenditures						
Calendar Year	Gross			Net		
	Expenditure	Inflated	Discounted	Expenditure	Inflated	Discounted
	(1)	(2)	(3)	(4)	(5)	(6)
2018						
2019	0	0	0	0	0	0
2020	0	0	0	0	0	0
2021	0	0	0	0	0	0
2022	6,667	6,969	6,389	6,000	6,272	5,750
2023	6,667	7,195	6,436	6,000	6,476	5,792
2024	6,667	7,447	6,495	6,000	6,702	5,846
2025	6,667	7,726	6,569	6,000	6,954	5,912
2026	6,667	8,036	6,656	6,000	7,232	5,991
2027	6,667	8,357	6,743	6,000	7,521	6,069
2028	6,667	8,691	6,828	6,000	7,822	6,146
2029	6,667	9,039	6,914	6,000	8,135	6,222
2030	6,667	9,400	6,998	6,000	8,460	6,299
2031	6,667	9,776	7,084	6,000	8,799	6,375
2032	6,667	10,167	7,168	6,000	9,151	6,451
2033	6,667	10,574	7,253	6,000	9,517	6,527
2034	6,667	10,997	7,337	6,000	9,897	6,603
2035	6,667	11,437	7,420	6,000	10,293	6,678
2036	6,667	11,895	7,504	6,000	10,705	6,753
2037	6,667	12,370	7,587	6,000	11,133	6,828
2038	6,667	12,865	7,670	6,000	11,579	6,903
2039	6,667	13,380	7,752	6,000	12,042	6,976
2040	6,667	13,915	7,834	6,000	12,523	7,050
2041	6,667	14,472	7,915	6,000	13,024	7,124
2042	6,667	15,050	7,997	6,000	13,545	7,197
2043	6,667	15,652	8,077	6,000	14,087	7,270
2044	6,667	16,278	8,158	6,000	14,651	7,342
2045	6,667	16,930	8,238	6,000	15,237	7,414
2046	6,667	17,607	8,318	6,000	15,846	7,486
2047	6,667	18,311	8,397	6,000	16,480	7,558
2048	6,667	19,044	8,476	6,000	17,139	7,629
2049	6,667	19,805	8,576	6,000	17,825	7,718
2050	6,667	20,597	8,656	6,000	18,538	7,791
2051	6,667	21,421	8,738	6,000	19,279	7,864
2052	6,667	22,278	8,820	6,000	20,050	7,938
2053	6,667	23,169	8,903	6,000	20,852	8,013
2054	6,667	24,096	8,987	6,000	21,687	8,088
2055	6,667	25,060	9,072	6,000	22,554	8,165
2056	6,667	26,062	9,157	6,000	23,456	8,241
2057	6,667	27,105	9,243	6,000	24,394	8,319
2058	6,667	28,189	9,330	6,000	25,370	8,397
2059	6,667	29,317	9,418	6,000	26,385	8,476
2060	6,667	30,489	9,507	6,000	27,440	8,556
2061	6,667	31,709	9,596	6,000	28,538	8,637
2062	6,667	32,977	9,687	6,000	29,680	8,718
2063	6,667	34,296	9,778	6,000	30,867	8,800
2064	6,667	35,668	9,870	6,000	32,101	8,883
2065	6,667	37,095	9,963	6,000	33,385	8,967
2066	6,667	38,579	10,057	6,000	34,721	9,051
2067	6,667	40,122	10,151	6,000	36,110	9,136
2068	6,667	41,727	10,247	6,000	37,554	9,222
2069	6,667	43,396	10,343	6,000	39,056	9,309
2070	6,667	45,132	10,441	6,000	40,618	9,397
2071	6,667	46,937	10,539	6,000	42,243	9,485
2072	6,667	48,814	10,638	6,000	43,933	9,574

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
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Exhibit 2.3						
Water Reclamation Expenditures						
Calendar Year	Gross			Net		
	Expenditure	Inflated	Discounted	Expenditure	Inflated	Discounted
	(1)	(2)	(3)	(4)	(5)	(6)
2073	6,667	50,767	10,738	6,000	45,690	9,665
2074	6,667	52,798	10,840	6,000	47,518	9,756
2075	6,667	54,910	10,942	6,000	49,419	9,847
2076	6,667	57,106	11,045	6,000	51,395	9,940
2077	6,667	59,390	11,149	6,000	53,451	10,034
2078	6,667	61,766	11,254	6,000	55,589	10,128
2079	6,667	64,236	11,359	6,000	57,813	10,224
2080	6,667	66,806	11,466	6,000	60,125	10,320
2081	6,667	69,478	11,574	6,000	62,530	10,417
2082	6,667	72,257	11,683	6,000	65,031	10,515
2083	6,667	75,147	11,793	6,000	67,633	10,614
2084	6,667	78,153	11,904	6,000	70,338	10,714
2085	6,667	81,279	12,016	6,000	73,152	10,815
2086	6,667	84,531	12,130	6,000	76,078	10,917
2087	6,667	87,912	12,244	6,000	79,121	11,019
2088	6,667	91,428	12,359	6,000	82,286	11,123
2089	6,667	95,085	12,475	6,000	85,577	11,228
2090	6,667	98,889	12,593	6,000	89,000	11,334
2091	6,667	102,844	12,711	6,000	92,560	11,440
2092	6,667	106,958	12,831	6,000	96,262	11,548
2093	6,667	111,237	12,952	6,000	100,113	11,657
2094	6,667	115,686	13,074	6,000	104,117	11,766
2095	6,667	120,313	13,197	6,000	108,282	11,877
2096	6,667	125,126	13,321	6,000	112,613	11,989
Total	500,000	3,081,727	717,581	450,000	2,773,554	645,823

Footnotes:

(1)	Exhibit 9.1 Row (25), spread over 75 years Payments for future forfeitures delayed by three years to reflect period between forfeiture order and reclamation activity.	(4)	Exhibit 9.1 Row (27), spread over 75 years Payments for future forfeitures delayed by three years to reflect period between forfeiture order and reclamation activity.
(2)	Col (1) x annual inflation of 0.0% for years 2019-20 3.0% for years 2021-22 3.5% for years 2023-24 4.0% for years 2025 & Subs	(5)	Col (4) x annual inflation of 0.0% for years 2019-20 3.0% for years 2021-22 3.5% for years 2023-24 4.0% for years 2025 & Subs
(3)	Col (2) + Col (2) x Exhibit 8 Col (3) Years 2048 and Subsequent based on 3.030% discount factor	(6)	Col (5) + Col (5) x Exhibit 8 Col (3) Years 2048 and Subsequent based on 3.030% discount factor

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
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Exhibit 3.1				
Remaining Performance Security Requirement				
Years Since Issuance	Active Pending Phase 1 Release	Final Map Pending Phase 1 Release	Pending Phase 2 Release	Pending Phase 3 Release
	(1)	(2)	(3)	(4)
1	100%	100%	50%	15%
2	100%	100%	50%	15%
3	100%	100%	50%	15%
4	100%	50%	50%	15%
5	100%	50%	50%	15%
6	100%	50%	50%	15%
7	100%	50%	15%	15%
8	50%	50%	15%	15%
9	50%	50%	15%	
10	50%	15%	15%	
11	50%	15%	15%	
12	50%	15%	15%	
13	50%	15%	15%	
14	15%	15%	15%	
15	15%	15%		
16	15%	15%		
17	15%	15%		
18	15%			
19	15%			
20	15%			
21	15%			

Footnotes:

(1) - (4) Judgmentally selected based on historic Ohio timing of various stages of the mining and reclamation process

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
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Exhibit 3.2									
Reclamation Lifecycles									
Evaluation Year Ending 6/30/XXXX	Final Map to Phase 1 release			Phase 1 release to Phase 2 release			Phase 2 release to Phase 3 release		
	Permit Count	Acres	Avg # Yrs	Permit Count	Acres	Avg # Yrs	Permit Count	Acres	Avg # Yrs
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1999	115	5,470	1.9	129	7,117	3.9	147	5,961	6.5
2000	73	2,615	1.2	113	4,751	3.8	179	8,688	6.5
2001	91	7,671	1.7	117	7,640	3.6	162	6,844	6.9
2002	73	2,444	1.3	78	2,862	3.5	110	5,277	6.8
2003	87	4,840	2.6	62	2,603	3.7	105	4,800	7.2
2004	67	2,778	1.7	62	2,519	3.6	108	5,121	7.2
2005	70	3,357	1.2	50	2,415	3.3	73	2,519	6.0
2006	70	2,580	2.2	71	4,187	3.6	78	3,452	6.8
2007	53	2,216	1.6	61	2,675	4.2	81	3,125	7.8
2008	64	3,221	1.7	63	2,348	4.0	69	2,558	6.7
2009	40	2,030	1.8	57	1,852	5.2	50	2,358	8.5
2010	44	2,475	1.9	46	2,114	6.0	70	3,037	8.0
2011	54	2,285	3.4	68	3,181	4.3	73	3,081	7.0
2012	36	2,083	4.0	33	1,512	6.6	61	2,687	8.9
2013	112	7,090	3.8	72	4,005	7.3	82	4,037	8.9
2014	66	3,462	2.7	80	4,470	5.9	93	3,989	8.7
2015			2.9			5.9			7.8
2016			2.5			4.9			6.4
2017			1.9			5.7			6.6
2018			6.2			11.7			10.0
Averages									
All Years Ex High/Low			2.27			4.76			7.40
Last 10 Years			3.11			6.35			8.08
Last 5 Years			3.24			6.82			7.90
Selected			3.00			6.00			8.00

Footnotes:

Years 1999 through 2014	From the September 2014 Office of Surface Mining Reclamation and Enforcement report "A Report on the Success of Achieving Reclamation Standards on Surface Coal Mining Operations in Ohio" Table C "Timing and Acreage Released Over a 16-Year Period"
Year 2015	From the September 2015 Office of Surface Mining Reclamation and Enforcement report "Annual Evaluation Summary Report Of the Regulatory and Abandoned Mine Land Programs" Page 19 through 22
Years 2016 through 2018	Data provided by the Ohio DNR Division of Mineral Resources Management.

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Exhibit 4.1

Performance Security Estimate (PSE)

PSE	Spring 2019	Spring 2017	Spring 2015	Spring 2013	Spring 2011	2019 vs. 2017	2019 vs. 2015	2019 vs. 2013	2019 vs. 2011
(1) Final Map PSE	136,452,000	120,359,000	70,508,800	170,182,000	170,812,000	16,093,000	65,943,200	(33,730,000)	(34,360,000)
(2) Active PSE	450,777,000	464,529,000	537,158,580	529,266,142	396,722,889	(13,752,000)	(86,381,580)	(78,489,142)	54,054,111
(3) Total PSE	587,229,000	584,888,000	607,667,380	699,448,142	567,534,889	2,341,000	(20,438,380)	(112,219,142)	19,694,111
(4) Bond Amount	42,443,728	44,980,415	54,665,778	71,783,943	69,293,576	(2,536,688)	(12,222,051)	(29,340,215)	(26,849,849)
(5) Total Net PSE	544,785,272	539,907,585	553,001,601	627,664,199	498,241,313	4,877,688	(8,216,329)	(82,878,926)	46,543,960

Footnotes:

(1), (2), (3), (5)

See report for details

(4)

Row (3) - Row (5)

Spring 2017, 2015, 2013 and 2011 Amounts from the Spring 2017, 2015, 2013 and 2011 Reports by Pinnacle



OHIO RECLAMATION FORFEITURE FUND ANALYSIS

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Exhibit 4.2

Net Adjusted PSE by Mine Status

Phase	Spring 2019	Spring 2017	Spring 2015	Spring 2013	Spring 2011	2019 vs. 2017	2019 vs. 2015	2019 vs. 2013	2019 vs. 2011
(1) Active - Pending Phase 1 release	318,196,825	352,568,360	339,402,844	420,449,906	271,267,028	(34,371,535)	(21,206,019)	(102,253,081)	46,929,797
(2) Active - Pending Phase 2 release	57,885,536	55,821,286	131,073,897	30,432,476	61,646,604	2,064,250	(73,188,361)	27,453,060	(3,761,068)
(3) Active - Pending Phase 3 release	46,738,450	23,802,450	21,723,796	28,552,017	16,381,793	22,936,000	25,014,654	18,186,433	30,356,657
(4) Active - Total	422,820,811	432,192,096	492,200,537	479,434,399	349,295,425	(9,371,285)	(69,379,726)	(56,613,588)	73,525,386
(5) Final Map - Pending Phase 1 release	115,915,647	94,307,850	39,256,913	139,564,625	138,898,250	21,607,797	76,658,734	(23,648,978)	(22,982,603)
(6) Final Map - Pending Phase 2 release	5,807,925	11,302,513	10,811,000	6,455,063	7,838,688	(5,494,588)	(5,003,075)	(647,138)	(2,030,763)
(7) Final Map - Pending Phase 3 release	240,890	2,105,127	10,733,152	2,210,113	2,208,950	(1,864,238)	(10,492,263)	(1,969,223)	(1,968,061)
(8) Final Map - Total	121,964,461	107,715,489	60,801,065	148,229,800	148,945,888	14,248,972	61,163,397	(26,265,339)	(26,981,426)
(9) Total Net Adjusted PSE	544,785,272	539,907,585	553,001,601	627,664,199	498,241,313	4,877,688	(8,216,329)	(82,878,926)	46,543,960

Footnotes:

(1) - (8)

See report for details

(9)

Row (4) + Row (8)

Spring 2017, 2015, 2013 and 2011 Amounts from the Spring 2017, 2015, 2013 and 2011 Reports by Pinnacle



OHIO RECLAMATION FORFEITURE FUND ANALYSIS

SPRING 2019

Exhibit 4.3

Average PSE

PSE Average	Spring 2019	Spring 2017	Spring 2015	Spring 2013	Spring 2011	2019 vs. 2017	2019 vs. 2015	2019 vs. 2013	2019 vs. 2011
(1) Total PSE Per Permit Count	3,941,134	3,481,476	3,232,273	3,108,658	2,384,600	11.66%	17.99%	21.12%	39.49%
(2) Net Adj PSE Per Permit Count	3,656,277	3,213,736	2,941,498	2,789,619	2,093,451	12.10%	19.55%	23.70%	42.74%
(3) Total PSE Per Bonded Acre	21,385	18,711	16,293	14,208	11,625	12.50%	23.81%	33.56%	45.64%
(4) Net Adj PSE Per Bonded Acre	19,839	17,272	14,828	12,750	10,206	12.94%	25.26%	35.73%	48.56%
(5) Total PSE Per Permit Count w/ PSE > Bond	5,338,445	4,397,654	3,452,656	3,346,642	2,782,034	17.62%	35.32%	37.31%	47.89%
(6) Net Adj PSE Per Permit Count w/ PSE > Bond	4,952,593	4,059,456	3,142,055	3,003,178	2,442,359	18.03%	36.56%	39.36%	50.69%

Footnotes:

- (1) Exhibit 4.1 Row (3) / Exhibit 7.6a Col (9) Total
- (2) Exhibit 4.1 Row (5) / Exhibit 7.6a Col (9) Total
- (3) Exhibit 4.1 Row (3) / Exhibit 7.6b Col (9) Total
- (4) Exhibit 4.1 Row (5) / Exhibit 7.6b Col (9) Total
- (5) Exhibit 4.1 Row (3) / Exhibit 7.2 Col (9) Total
- (6) Exhibit 4.1 Row (5) / Exhibit 7.2 Col (9) Total

Spring 2017, 2015, 2013 and 2011 Amounts from the Spring 2017, 2015, 2013 and 2011 Reports by Pinnacle



OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2019

Exhibit 5.1 Forfeiture Rates	
Years Since Issuance	All Permit Types (1)
1	0.00%
2	0.00%
3	0.50%
4	0.50%
5	0.50%
6	0.50%
7	0.50%
8	0.50%
9	0.50%
10	0.50%
11	0.50%
12	0.50%
13	0.50%
14	0.50%
15	0.50%
16	0.50%
17	0.50%
18	0.50%
19	0.50%
20	0.50%
21	0.50%

Footnotes:

(1)

Exhibit 5.2 Row (10)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2019

Exhibit 5.2 Forfeiture Rate Calculation			
Evaluation Year Ending 6/30/XXXX	Number of Permits		Forfeiture Rate
	In Force	Forfeited	
	(1)	(2)	(3)
1993	799	6	0.75%
1994	775	16	2.06%
1995	722	1	0.14%
1996	683	29	4.25%
1997	579	4	0.69%
1998	568	5	0.88%
1999	563	2	0.36%
2000	456	17	3.73%
2001	389	2	0.51%
2002	363	3	0.83%
2003	357	3	0.84%
2004	356	2	0.56%
2005	338	8	2.37%
2006	329	0	0.00%
2007	321	0	0.00%
2008	308	0	0.00%
2009	290	0	0.00%
2010	266	0	0.00%
2011	252	0	0.00%
2012	246	0	0.00%
2013	229	0	0.00%
2014	224	0	0.00%
2015	220	6	2.73%
2016	209	0	0.00%
2017	194	0	0.00%
2018	181	0	0.00%
Total	10,217	104	1.02%
(4a) Average lifetime of permit			21.00
(4b) Selected average lifetime of permits w/o forfeitures			19.00
(5) Ohio indicated forfeiture annual incremental rate			0.05%
(6) Kentucky forfeiture annual incremental rate			1.43%
(7) West Virginia forfeiture annual incremental rate			1.02%
(8) Weighted factor			0.86
(9) Weighted indicated forfeiture annual incremental rate			0.61%
(10) Ohio selected forfeiture annual incremental rate			0.50%

Footnotes:

- (1) Office of Surface Mining Reclamation and Enforcement annual evaluation reports of all mine sites in Ohio
- (2) Client data
- (3) Col (2) / Col (1)
- (4a) Exhibit 3.1
- (4b) Selected average lifetime based on assumption of minimal forfeitures within the first two years of issuance
- (5) Col (3) / Row (4b)
- (6) From Pinnacle analysis of Kentucky data applied to Ohio permit count by mine type distribution
- (7) From Pinnacle analysis of West Virginia data applied to Ohio permit count by mine type distribution
- (8) Exhibit 5.3 Col (4)
- (9) [Weighted average of rows (5) through (7)] / row (8) based on...
OH = 60.0%, KY = 20.0% and WV = 20.0%
- (10) Selected based on rows (5), (6), (7), and (9)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS				
SPRING 2019				
Exhibit 5.3				
Forfeiture Rate Adjustment Factor for Mine Status				
Mine Status	Factor	Net Adjusted PSE	Weighted Net Adj PSE	Weighted Factor
	(1)	(2)	(3)	(4)
Active, Pending Phase 1 Release	1.00	318,196,825	318,196,825	
Final Map, Pending Phase 1 Release	0.80	115,915,647	92,732,518	
Pending Phase 2 Release	0.67	63,693,461	42,674,619	
Pending Phase 3 Release	0.33	46,979,340	15,503,182	
Total	0.33	544,785,272	469,107,143	0.86

Footnotes:

- (1) Judgmentally selected
These factors are intended to reflect that the probability of forfeiture declines as the reclamation process moves from active mining to reclamation and on to final release.
- (2) Exhibit 4.2
- (3) Col (1) x Col (2)
- (4) Col (3) / Col (2)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS

SPRING 2019

Exhibit 6									
Net Reclamation Cost by Mine Status									
Phase	Spring 2019	Spring 2017	Spring 2015	Spring 2013	Spring 2011	2019 vs. 2017	2019 vs. 2015	2019 vs. 2013	2019 vs. 2011
(1) Active - Pending Phase 1 release	11,893,451	12,346,477	15,872,249	9,110,576	23,279,440	(453,027)	(3,978,799)	2,782,874	(11,385,989)
(2) Active - Pending Phase 2 release	1,135,608	1,103,194	3,800,171	339,359	1,491,776	32,415	(2,664,563)	796,249	(356,168)
(3) Active - Pending Phase 3 release	616,948	314,192	411,492	244,034	192,800	302,755	205,455	372,913	424,148
(4) Active - Total	13,646,006	13,763,863	20,083,913	9,693,970	24,964,016	(117,857)	(6,437,906)	3,952,036	(11,318,009)
(5) Final Map - Pending Phase 1 release	2,557,631	2,072,483	1,296,140	1,813,560	4,363,792	485,148	1,261,491	744,071	(1,806,161)
(6) Final Map - Pending Phase 2 release	118,113	225,312	319,172	71,130	201,678	(107,200)	(201,059)	46,983	(83,566)
(7) Final Map - Pending Phase 3 release	3,180	27,788	203,307	18,890	22,973	(24,608)	(200,128)	(15,710)	(19,794)
(8) Final Map - Total	2,678,924	2,325,583	1,818,619	1,903,579	4,588,444	353,340	860,304	775,345	(1,909,520)
(9) Total Net Reclamation Cost	16,324,930	16,089,447	21,902,532	11,597,549	29,552,459	235,483	(5,577,602)	4,727,381	(13,227,530)

Footnotes:

- (1), (2), (3), (5), (6), (7) See report for details
 (4) Row (1) + Row (2) + Row (3)
 (8) Row (5) + Row (6) + Row (7)
 (9) Row (4) + Row (8)

Spring 2017, 2015, 2013 and 2011 Amounts from the Spring 2017, 2015, 2013 and 2011 Reports by Pinnacle



OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2019

Exhibit 7.1a						
Permit Information by Parent Company						
Parent Company	Total PSE	Bond Amount	Net Adjusted PSE	Permit Count	Implied Bond Acres	Net Reclamation Cost
	(1)	(2)	(3)	(4)	(5)	(6)
MURRAY ENERGY	208,819,000	6,607,498	202,211,502	13	3,286	7,242,985
WESTMORELAND COAL COMPANY	118,595,000	16,514,025	102,080,975	51	12,616	3,470,483
CONSOL ENERGY	79,093,000	2,958,750	76,134,250	4	2,912	1,698,983
WATERLOO COAL CO INC	62,594,000	3,492,352	59,101,648	8	2,148	1,269,311
RHINO ENERGY, LLC	56,750,000	3,231,088	53,518,913	11	1,001	1,036,179
DTE DICKERSON LLC	15,060,000	1,023,500	14,036,500	1	83	476,062
KIMBLE CLAY & LIMESTONE	12,674,000	2,447,700	10,226,300	13	1,112	376,959
ROSEBUD MINING COMPANY LLC	11,006,000	2,180,600	8,825,400	24	2,679	248,709
B & N COAL INC	6,165,000	1,722,250	4,442,750	5	361	119,976
SIDWELL MATERIALS INC	3,897,000	441,563	3,455,438	2	122	98,419
ANTHONY MINING CO INC	2,582,000	639,000	1,943,000	2	226	41,006
AMERICAN LANDFILL INC	2,385,000	115,175	2,269,825	1	22	75,614
THOMPSON BROTHERS MINING	2,323,000	229,100	2,093,900	3	104	45,930
ETTA MAE INC	2,218,000	91,438	2,126,563	1	124	42,485
MARIETTA COAL COMPANY	1,104,000	80,750	1,023,250	2	86	35,598
L & M MINERAL CO	854,000	133,750	720,250	2	51	33,873
VALLEY MINING INC	792,000	411,978	380,022	1	366	8,072
STATE LINE RESOURCES INC	274,000	79,213	194,788	1	79	4,285
F & M COAL CO	14,000	14,000	0	1	42	0
GEORGETOWN MARINE INC	10,000	10,000	0	1	4	0
CHAMBERS DEVL OF OHIO INC	10,000	10,000	0	1	30	0
COLLIER PORTS INC	10,000	10,000	0	1	6	0
Total	587,229,000	42,443,728	544,785,272	149	27,460	16,324,930
<i>Spring 2017 Total</i>	<i>584,888,000</i>	<i>44,980,415</i>	<i>539,907,585</i>	<i>168</i>	<i>31,259</i>	<i>16,089,447</i>
<i>Spring 2015 Total</i>	<i>607,667,380</i>	<i>54,665,778</i>	<i>553,001,601</i>	<i>188</i>	<i>37,295</i>	<i>21,902,532</i>
<i>Spring 2013 Total</i>	<i>699,448,142</i>	<i>71,783,943</i>	<i>627,664,199</i>	<i>225</i>	<i>49,229</i>	<i>11,597,549</i>
<i>Spring 2011 Total</i>	<i>567,534,889</i>	<i>69,293,576</i>	<i>498,241,313</i>	<i>238</i>	<i>48,820</i>	<i>29,552,459</i>
2019 vs. 2017	2,341,000	(2,536,688)	4,877,688	(19)	(3,798)	235,483
2019 vs. 2015	(20,438,380)	(12,222,051)	(8,216,329)	(39)	(9,835)	(5,577,602)
2019 vs. 2013	(112,219,142)	(29,340,215)	(82,878,926)	(76)	(21,769)	4,727,381
2019 vs. 2011	19,694,111	(26,849,849)	46,543,960	(89)	(21,360)	(13,227,530)

Footnotes:

(1), (2), (3), (4), (5), (6) See report for details; reflects permits in the Reclamation Forfeiture Fund

Spring 2017, 2015, 2013 and 2011 Amounts from the Spring 2017, 2015, 2013 and 2011 Reports by Pinnacle

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
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Exhibit 7.1b Top Five Parent Companies						
Parent Company	Net Adjusted PSE			Net Reclamation Cost		
	Amount	% of Total	Average	Amount	% of Total	Average
	(1)	(2)	(3)	(4)	(5)	(6)
MURRAY ENERGY	202,211,502	37.12%		7,242,985	44.37%	
WESTMORELAND COAL COMPANY	102,080,975	18.74%		3,470,483	21.26%	
CONSOL ENERGY	76,134,250	13.98%		1,698,983	10.41%	
WATERLOO COAL CO INC	59,101,648	10.85%		1,269,311	7.78%	
RHINO ENERGY, LLC	53,518,913	9.82%		1,036,179	6.35%	
Subtotal	493,047,288	90.50%	98,609,458	14,717,942	90.16%	2,943,588
Remaining Parent Companies	51,737,985	9.50%	3,979,845	1,606,988	9.84%	123,614
Total	544,785,272	100.00%	30,265,848	16,324,930	100.00%	906,941
<i>Spring 2017 Total</i>	<i>539,907,585</i>		<i>25,709,885</i>	<i>16,089,447</i>		<i>766,164</i>
<i>Spring 2015 Total</i>	<i>553,001,601</i>		<i>20,481,541</i>	<i>21,902,532</i>		<i>811,205</i>
<i>Spring 2013 Total</i>	<i>627,664,199</i>		<i>20,922,140</i>	<i>11,597,549</i>		<i>386,585</i>
<i>Spring 2011 Total</i>	<i>498,241,313</i>		<i>13,840,036</i>	<i>29,552,459</i>		<i>820,902</i>
2019 vs. 2017	4,877,688		15.05%	235,483		15.52%
2019 vs. 2015	(8,216,329)		32.33%	(5,577,602)		10.56%
2019 vs. 2013	(82,878,926)		30.87%	4,727,381		57.37%
2019 vs. 2011	46,543,960		54.27%	(13,227,530)		9.49%

Footnotes:

- (1) Exhibit 7.1a Col (3)
- (2) Col (1) / Total Col (1)
- (3) Derived from Exhibit 7.1a Col (3)
- (4) Exhibit 7.1a Col (6)
- (5) Col (4) / Total Col (4)
- (6) Derived from Exhibit 7.1a Col (6)

Spring 2017, 2015, 2013 and 2011 Amounts from the Spring 2017, 2015, 2013 and 2011 Reports by Pinnacle

**OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2019**

Exhibit 7.1c Parent Company Counts by PSE Range and Net Reclamation Cost Range			
Net Adjusted PSE	Company Count	Net Reclamation Cost	Company Count
(1)	(2)	(3)	(4)
\$0	4	\$0	4
\$0 to 100K	0	\$0 to 10K	2
\$100K to 1M	3	\$10K to 100K	7
\$1M to 2.5M	5	\$100K to 500K	4
\$2.5M to 5M	2	\$500K to 1M	0
\$5M to 9M	1	\$1M to 2M	3
\$9M to 25M	2	\$2M to 5M	1
Over \$25M	5	Over \$5M	1
Total	22	Total	22

Footnotes:

- (2) Exhibit 7.1a Col (3)
(4) Exhibit 7.1a Col (6)

**OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2019**

Exhibit 7.2									
Permits Counts with a Performance Security Estimate Greater Than Bond on Hand									
Issue Year	Active				Final Map				Total
	Phase 1	Phase 2	Phase 3	Total	Phase 1	Phase 2	Phase 3	Total	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1982	0	0	1	1	0	0	0	0	1
1983	5	0	0	5	2	0	0	2	7
1984	7	0	0	7	1	0	0	1	8
1985	1	0	0	1	1	0	0	1	2
1986	0	0	0	0	0	0	0	0	0
1987	3	0	0	3	1	0	0	1	4
1988	1	1	0	2	0	0	0	0	2
1989	2	0	0	2	0	0	0	0	2
1990	0	0	0	0	0	0	0	0	0
1991	1	0	0	1	0	0	0	0	1
1992	1	1	1	3	1	0	0	1	4
1993	0	2	0	2	0	0	0	0	2
1994	2	1	1	4	0	0	0	0	4
1995	0	0	0	0	0	1	0	1	1
1996	1	0	0	1	0	2	0	2	3
1997	0	0	0	0	0	0	0	0	0
1998	1	0	0	1	3	0	0	3	4
1999	0	1	0	1	0	0	0	0	1
2000	0	0	0	0	1	0	0	1	1
2001	1	0	0	1	0	0	0	0	1
2002	0	0	0	0	0	0	0	0	0
2003	1	1	0	2	1	0	0	1	3
2004	4	0	0	4	0	0	0	0	4
2005	1	1	0	2	0	1	0	1	3
2006	4	0	0	4	2	1	0	3	7
2007	3	2	0	5	1	0	1	2	7
2008	1	0	0	1	1	2	1	4	5
2009	2	0	0	2	0	2	0	2	4
2010	1	0	0	1	0	1	0	1	2
2011	0	1	0	1	2	4	0	6	7
2012	2	0	0	2	1	2	1	4	6
2013	3	0	0	3	2	0	0	2	5
2014	5	0	0	5	0	0	0	0	5
2015	1	0	0	1	0	0	0	0	1
2016	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0
2018	3	0	0	3	0	0	0	0	3
Total	57	11	3	71	20	16	3	39	110
<i>Spring 2017 Total</i>	<i>63</i>	<i>12</i>	<i>3</i>	<i>78</i>	<i>21</i>	<i>24</i>	<i>10</i>	<i>55</i>	<i>133</i>
<i>Spring 2015 Total</i>	<i>96</i>	<i>26</i>	<i>4</i>	<i>126</i>	<i>9</i>	<i>13</i>	<i>28</i>	<i>50</i>	<i>176</i>
<i>Spring 2013 Total</i>	<i>107</i>	<i>9</i>	<i>6</i>	<i>122</i>	<i>31</i>	<i>26</i>	<i>30</i>	<i>87</i>	<i>209</i>
<i>Spring 2011 Total</i>				<i>119</i>				<i>85</i>	<i>204</i>
2019 vs. 2017	(6)	(1)	0	(7)	(1)	(8)	(7)	(16)	(23)
2019 vs. 2015	(39)	(15)	(1)	(55)	11	3	(25)	(11)	(66)
2019 vs. 2013	(50)	2	(3)	(51)	(11)	(10)	(27)	(48)	(99)
2019 vs. 2011				(48)				(46)	(94)

Footnotes:

- (1) Client provided data, Pending Phase 1 Release
- (2) Client provided data, Pending Phase 2 Release
- (3) Client provided data, Pending Phase 3 Release
- (4) Sum of Col (1) through Col (3)

- (5) Client provided data, Pending Phase 1 Release
- (6) Client provided data, Pending Phase 2 Release
- (7) Client provided data, Pending Phase 3 Release
- (8) Sum of Col (5) through Col (7)
- (9) Col (4) + Col (8)

Spring 2017, 2015, 2013 and 2011 Amounts from the Spring 2017, 2015, 2013 and 2011 Reports by Pinnacle

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
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Exhibit 7.3a									
Permits Counts by Mine Status and Year of Issuance - Surface									
Issue Year	Active				Final Map				Total
	Phase 1	Phase 2	Phase 3	Total	Phase 1	Phase 2	Phase 3	Total	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1982	0	0	0	0	0	0	0	0	0
1983	1	0	0	1	0	0	0	0	1
1984	2	0	0	2	0	0	0	0	2
1985	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0
1987	1	0	0	1	1	0	0	1	2
1988	1	0	0	1	0	0	0	0	1
1989	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0
1991	1	0	0	1	0	0	0	0	1
1992	1	1	1	3	1	0	0	1	4
1993	0	2	0	2	0	0	0	0	2
1994	2	1	1	4	0	0	0	0	4
1995	1	1	0	2	0	1	0	1	3
1996	1	0	0	1	0	2	0	2	3
1997	0	0	0	0	0	0	0	0	0
1998	2	0	0	2	2	1	0	3	5
1999	0	1	0	1	0	0	1	1	2
2000	0	0	0	0	1	1	0	2	2
2001	1	0	0	1	0	0	0	0	1
2002	0	0	0	0	0	1	0	1	1
2003	1	1	0	2	1	0	0	1	3
2004	3	0	0	3	1	0	1	2	5
2005	0	1	0	1	0	1	0	1	2
2006	4	0	0	4	2	2	0	4	8
2007	4	2	0	6	1	1	1	3	9
2008	1	0	0	1	2	3	1	6	7
2009	1	0	0	1	1	2	0	3	4
2010	1	0	0	1	0	2	0	2	3
2011	1	2	0	3	2	4	0	6	9
2012	2	0	0	2	2	3	1	6	8
2013	4	0	0	4	2	0	0	2	6
2014	7	0	0	7	0	0	0	0	7
2015	3	0	0	3	0	0	0	0	3
2016	3	0	0	3	0	0	0	0	3
2017	1	0	0	1	0	0	0	0	1
2018	2	0	0	2	0	0	0	0	2
Total	52	12	2	66	19	24	5	48	114
<i>Spring 2017 Total</i>	<i>58</i>	<i>12</i>	<i>2</i>	<i>72</i>	<i>16</i>	<i>33</i>	<i>12</i>	<i>61</i>	<i>133</i>
<i>Spring 2015 Total</i>	<i>76</i>	<i>25</i>	<i>4</i>	<i>105</i>	<i>4</i>	<i>19</i>	<i>28</i>	<i>51</i>	<i>156</i>
<i>Spring 2013 Total</i>	<i>89</i>	<i>7</i>	<i>5</i>	<i>101</i>	<i>30</i>	<i>34</i>	<i>30</i>	<i>94</i>	<i>195</i>
<i>Spring 2011 Total</i>				<i>103</i>				<i>104</i>	<i>207</i>
2019 vs. 2017	(6)	0	0	(6)	3	(9)	(7)	(13)	(19)
2019 vs. 2015	(24)	(13)	(2)	(39)	15	5	(23)	(3)	(42)
2019 vs. 2013	(37)	5	(3)	(35)	(11)	(10)	(25)	(46)	(81)
2019 vs. 2011				(37)				(56)	(93)

Permits Released Since Spring 2017	22
Total PSE of Permits Released Since Spring 2017	6,972,000
Net Adjusted PSE of Permits Released Since Spring 2017	5,074,813

Permits Issued Since Spring 2017	3
Total PSE of Permits Issued Since Spring 2017	5,565,000
Net Adjusted PSE of Permits Issued Since Spring 2017	5,093,500

Permits remaining in system from Spring 2017 to Spring 2019	111
Total PSE change of permits remaining in system from Spring 2017 to Spring 2019	(8,070,000)
Net Adjusted PSE change of permits remaining in system from Spring 2017 to Spring 2019	(7,108,250)

Footnotes:

(1)	Client provided data, Pending Phase 1 Release	(5)	Client provided data, Pending Phase 1 Release
(2)	Client provided data, Pending Phase 2 Release	(6)	Client provided data, Pending Phase 2 Release
(3)	Client provided data, Pending Phase 3 Release	(7)	Client provided data, Pending Phase 3 Release
(4)	Sum of Col (1) through Col (3)	(8)	Sum of Col (5) through Col (7)
		(9)	Col (4) + Col (8)

Spring 2017, 2015, 2013 and 2011 Amounts from the Spring 2017, 2015, 2013 and 2011 Reports by Pinnacle

**OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2019**

Exhibit 7.3b									
Implied Bonded Acres by Mine Status and Year of Issuance - Surface									
Issue Year	Active				Final Map				Total
	Phase 1	Phase 2	Phase 3	Total	Phase 1	Phase 2	Phase 3	Total	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1982	0	0	0	0	0	0	0	0	0
1983	75	0	0	75	0	0	0	0	75
1984	43	3	4	49	0	0	0	0	49
1985	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0
1987	20	0	0	20	49	109	156	314	334
1988	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0
1991	35	0	0	35	0	0	0	0	35
1992	3	123	217	343	13	19	91	124	467
1993	0	12	27	40	0	0	0	0	40
1994	13	78	299	389	0	0	0	0	389
1995	30	147	210	388	0	76	174	251	638
1996	32	0	0	32	0	341	564	905	937
1997	0	0	0	0	0	0	0	0	0
1998	44	18	25	86	128	427	783	1,338	1,425
1999	0	3	60	62	0	0	101	101	163
2000	0	0	0	0	4	34	58	96	96
2001	24	123	176	323	0	0	0	0	323
2002	0	0	0	0	0	31	44	74	74
2003	24	9	13	46	16	366	523	905	952
2004	54	138	226	418	10	13	235	258	676
2005	0	7	88	96	0	12	173	185	280
2006	189	373	660	1,222	95	651	964	1,709	2,931
2007	316	486	1,064	1,865	33	278	910	1,221	3,086
2008	114	322	608	1,044	51	780	1,702	2,534	3,577
2009	29	54	131	215	0	351	532	883	1,098
2010	9	13	18	40	0	118	169	287	327
2011	6	268	383	657	241	810	1,157	2,208	2,864
2012	46	38	134	218	41	329	585	955	1,173
2013	189	0	0	189	59	83	118	260	449
2014	330	68	98	496	0	0	0	0	496
2015	12	0	0	12	0	0	0	0	12
2016	12	0	0	12	0	0	0	0	12
2017	13	0	0	13	0	0	0	0	13
2018	8	0	0	8	0	0	0	0	8
Total	1,668	2,283	4,441	8,392	742	4,828	9,037	14,607	22,999
<i>Spring 2017 Total</i>	<i>2,295</i>	<i>3,680</i>	<i>6,530</i>	<i>12,505</i>	<i>411</i>	<i>4,202</i>	<i>9,384</i>	<i>13,997</i>	<i>26,502</i>
<i>Spring 2015 Total</i>	<i>2,736</i>	<i>6,913</i>	<i>12,157</i>	<i>21,806</i>	<i>213</i>	<i>2,108</i>	<i>8,124</i>	<i>10,444</i>	<i>32,251</i>
<i>Spring 2013 Total</i>	<i>3,744</i>	<i>5,903</i>	<i>10,283</i>	<i>19,931</i>	<i>1,723</i>	<i>6,762</i>	<i>15,465</i>	<i>23,950</i>	<i>43,881</i>
<i>Spring 2011 Total</i>				<i>18,571</i>				<i>23,585</i>	<i>42,157</i>
2019 vs. 2017	(627)	(1,398)	(2,089)	(4,113)	331	626	(347)	610	(3,503)
2019 vs. 2015	(1,068)	(4,630)	(7,716)	(13,414)	529	2,720	913	4,163	(9,251)
2019 vs. 2013	(2,076)	(3,621)	(5,842)	(11,539)	(981)	(1,934)	(6,428)	(9,343)	(20,882)
2019 vs. 2011				(10,179)				(8,978)	(19,158)

Acres Released Since Spring 2017	3,288
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Acres Issued Since Spring 2017	21
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Footnotes:

- | | | | |
|-----|---|-----|---|
| (1) | Client provided data, Pending Phase 1 Release | (5) | Client provided data, Pending Phase 1 Release |
| (2) | Client provided data, Pending Phase 2 Release | (6) | Client provided data, Pending Phase 2 Release |
| (3) | Client provided data, Pending Phase 3 Release | (7) | Client provided data, Pending Phase 3 Release |
| (4) | Sum of Col (1) through Col (3) | (8) | Sum of Col (5) through Col (7) |
| | | (9) | Col (4) + Col (8) |

Spring 2017, 2015, 2013 and 2011 Amounts from the Spring 2017, 2015, 2013 and 2011 Reports by Pinnacle

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2019

Exhibit 7.4a									
Permits Counts by Mine Status and Year of Issuance - Underground									
Issue Year	Active				Final Map				Total
	Phase 1	Phase 2	Phase 3	Total	Phase 1	Phase 2	Phase 3	Total	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1982	0	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	0
1984	3	0	0	3	2	0	0	2	5
1985	0	0	0	0	1	0	0	1	1
1986	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	1	0	0	1	1
1999	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0
2004	1	0	0	1	0	0	0	0	1
2005	1	0	0	1	0	0	0	0	1
2006	1	0	0	1	0	0	0	0	1
2007	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0
2012	1	0	0	1	1	0	0	1	2
2013	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0
2015	2	0	0	2	0	0	0	0	2
2016	1	0	0	1	0	0	0	0	1
2017	0	0	0	0	0	0	0	0	0
2018	1	0	0	1	0	0	0	0	1
Total	11	0	0	11	5	0	0	5	16
<i>Spring 2017 Total</i>	<i>10</i>	<i>0</i>	<i>0</i>	<i>10</i>	<i>5</i>	<i>0</i>	<i>0</i>	<i>5</i>	<i>15</i>
<i>Spring 2015 Total</i>	<i>7</i>	<i>0</i>	<i>0</i>	<i>7</i>	<i>5</i>	<i>0</i>	<i>0</i>	<i>5</i>	<i>12</i>
<i>Spring 2013 Total</i>	<i>7</i>	<i>1</i>	<i>0</i>	<i>8</i>	<i>4</i>	<i>0</i>	<i>0</i>	<i>4</i>	<i>12</i>
<i>Spring 2011 Total</i>				<i>8</i>				<i>5</i>	<i>13</i>
2019 vs. 2017	1	0	0	1	0	0	0	0	1
2019 vs. 2015	4	0	0	4	0	0	0	0	4
2019 vs. 2013	4	(1)	0	3	1	0	0	1	4
2019 vs. 2011				3				0	3

Permits Released Since Spring 2017	1
Total PSE of Permits Released Since Spring 2017	159,000
Net Adjusted PSE of Permits Released Since Spring 2017	0

Permits Issued Since Spring 2017	1
Total PSE of Permits Issued Since Spring 2017	1,093,000
Net Adjusted PSE of Permits Issued Since Spring 2017	1,083,000

Permits remaining in system from Spring 2017 to Spring 2019	15
Total PSE change of permits remaining in system from Spring 2017 to Spring 2019	(14,972,000)
Net Adjusted PSE change of permits remaining in system from Spring 2017 to Spring 2019	(14,919,750)

Footnotes:

(1)	Client provided data, Pending Phase 1 Release	(5)	Client provided data, Pending Phase 1 Release
(2)	Client provided data, Pending Phase 2 Release	(6)	Client provided data, Pending Phase 2 Release
(3)	Client provided data, Pending Phase 3 Release	(7)	Client provided data, Pending Phase 3 Release
(4)	Sum of Col (1) through Col (3)	(8)	Sum of Col (5) through Col (7)
		(9)	Col (4) + Col (8)

Spring 2017, 2015, 2013 and 2011 Amounts from the Spring 2017, 2015, 2013 and 2011 Reports by Pinnacle

**OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2019**

Exhibit 7.4b									
Implied Bonded Acres by Mine Status and Year of Issuance - Underground									
Issue Year	Active				Final Map				Total
	Phase 1	Phase 2	Phase 3	Total	Phase 1	Phase 2	Phase 3	Total	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1982	0	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	0
1984	124	51	73	247	437	771	1,102	2,311	2,558
1985	0	0	0	0	8	204	291	502	502
1986	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	33	49	70	153	153
1999	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0
2004	79	0	0	79	0	0	0	0	79
2005	28	39	56	123	0	0	0	0	123
2006	45	0	0	45	0	0	0	0	45
2007	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0
2012	32	0	0	32	22	30	43	95	128
2013	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0
2015	8	0	0	8	0	0	0	0	8
2016	4	0	0	4	0	0	0	0	4
2017	0	0	0	0	0	0	0	0	0
2018	4	0	0	4	0	0	0	0	4
Total	325	90	128	543	500	1,055	1,507	3,061	3,604
<i>Spring 2017 Total</i>	<i>321</i>	<i>90</i>	<i>128</i>	<i>539</i>	<i>516</i>	<i>1,167</i>	<i>1,667</i>	<i>3,350</i>	<i>3,889</i>
<i>Spring 2015 Total</i>	<i>286</i>	<i>60</i>	<i>86</i>	<i>432</i>	<i>509</i>	<i>1,155</i>	<i>1,650</i>	<i>3,314</i>	<i>3,745</i>
<i>Spring 2013 Total</i>	<i>792</i>	<i>60</i>	<i>85</i>	<i>937</i>	<i>483</i>	<i>1,118</i>	<i>1,597</i>	<i>3,197</i>	<i>4,134</i>
<i>Spring 2011 Total</i>				<i>480</i>				<i>4,873</i>	<i>5,353</i>
2019 vs. 2017	4	0	0	4	(16)	(112)	(160)	(289)	(285)
2019 vs. 2015	38	30	43	111	(10)	(100)	(143)	(253)	(141)
2019 vs. 2013	(467)	30	43	(394)	17	(63)	(90)	(136)	(530)
2019 vs. 2011				63				(1,812)	(1,749)

Acres Released Since Spring 2017	384
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Acres Issued Since Spring 2017	4
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Footnotes:

- | | | | |
|-----|---|-----|---|
| (1) | Client provided data, Pending Phase 1 Release | (5) | Client provided data, Pending Phase 1 Release |
| (2) | Client provided data, Pending Phase 2 Release | (6) | Client provided data, Pending Phase 2 Release |
| (3) | Client provided data, Pending Phase 3 Release | (7) | Client provided data, Pending Phase 3 Release |
| (4) | Sum of Col (1) through Col (3) | (8) | Sum of Col (5) through Col (7) |
| | | (9) | Col (4) + Col (8) |

Spring 2017, 2015, 2013 and 2011 Amounts from the Spring 2017, 2015, 2013 and 2011 Reports by Pinnacle

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2019

Exhibit 7.5a									
Permits Counts by Mine Status and Year of Issuance - Facility Operations									
Issue Year	Active				Final Map				Total
	Phase 1	Phase 2	Phase 3	Total	Phase 1	Phase 2	Phase 3	Total	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1982	0	0	1	1	0	0	0	0	1
1983	4	0	0	4	2	0	0	2	6
1984	2	0	0	2	0	0	0	0	2
1985	1	0	0	1	0	0	0	0	1
1986	0	0	0	0	0	0	0	0	0
1987	2	0	0	2	0	0	0	0	2
1988	0	1	0	1	0	0	0	0	1
1989	2	0	0	2	0	0	0	0	2
1990	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0
2009	1	0	0	1	0	0	0	0	1
2010	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0
2013	1	0	0	1	0	0	0	0	1
2014	1	0	0	1	0	0	0	0	1
2015	1	0	0	1	0	0	0	0	1
2016	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0
Total	15	1	1	17	2	0	0	2	19
<i>Spring 2017 Total</i>	<i>16</i>	<i>1</i>	<i>1</i>	<i>18</i>	<i>2</i>	<i>0</i>	<i>0</i>	<i>2</i>	<i>20</i>
<i>Spring 2015 Total</i>	<i>16</i>	<i>1</i>	<i>1</i>	<i>18</i>	<i>2</i>	<i>0</i>	<i>0</i>	<i>2</i>	<i>20</i>
<i>Spring 2013 Total</i>	<i>14</i>	<i>1</i>	<i>1</i>	<i>16</i>	<i>2</i>	<i>0</i>	<i>0</i>	<i>2</i>	<i>18</i>
<i>Spring 2011 Total</i>				<i>16</i>				<i>2</i>	<i>18</i>
2019 vs. 2017	(1)	0	0	(1)	0	0	0	0	(1)
2019 vs. 2015	(1)	0	0	(1)	0	0	0	0	(1)
2019 vs. 2013	1	0	0	1	0	0	0	0	1
2019 vs. 2011				1				0	1

Permits Released Since Spring 2017	1
Total PSE of Permits Released Since Spring 2017	82,000
Net Adjusted PSE of Permits Released Since Spring 2017	62,500

Permits Issued Since Spring 2017	1
Total PSE of Permits Issued Since Spring 2017	103,000
Net Adjusted PSE of Permits Issued Since Spring 2017	89,000

Permits remaining in system from Spring 2017 to Spring 2019	18
Total PSE change of permits remaining in system from Spring 2017 to Spring 2019	25,835,000
Net Adjusted PSE change of permits remaining in system from Spring 2017 to Spring 2019	25,777,500

Footnotes:

(1)	Client provided data, Pending Phase 1 Release	(5)	Client provided data, Pending Phase 1 Release
(2)	Client provided data, Pending Phase 2 Release	(6)	Client provided data, Pending Phase 2 Release
(3)	Client provided data, Pending Phase 3 Release	(7)	Client provided data, Pending Phase 3 Release
(4)	Sum of Col (1) through Col (3)	(8)	Sum of Col (5) through Col (7)
		(9)	Col (4) + Col (8)

Spring 2017, 2015, 2013 and 2011 Amounts from the Spring 2017, 2015, 2013 and 2011 Reports by Pinnacle

**OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2019**

Exhibit 7.5b									
Implied Bonded Acres by Mine Status and Year of Issuance - Facility Operations									
Issue Year	Active				Final Map				Total
	Phase 1	Phase 2	Phase 3	Total	Phase 1	Phase 2	Phase 3	Total	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1982	0	0	4	4	0	0	0	0	4
1983	84	26	38	148	35	58	85	178	326
1984	55	5	7	67	0	0	0	0	67
1985	0	31	45	76	0	0	0	0	76
1986	0	0	0	0	0	0	0	0	0
1987	25	0	0	25	0	0	0	0	25
1988	0	31	47	78	0	0	0	0	78
1989	17	0	0	17	0	0	0	0	17
1990	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0
2009	133	0	0	133	0	0	0	0	133
2010	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0
2013	101	0	0	101	0	0	0	0	101
2014	27	0	0	27	0	0	0	0	27
2015	4	0	0	4	0	0	0	0	4
2016	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0
Total	444	94	141	679	35	58	85	178	857
<i>Spring 2017 Total</i>	<i>448</i>	<i>97</i>	<i>144</i>	<i>690</i>	<i>35</i>	<i>58</i>	<i>85</i>	<i>178</i>	<i>867</i>
<i>Spring 2015 Total</i>	<i>416</i>	<i>123</i>	<i>184</i>	<i>724</i>	<i>131</i>	<i>183</i>	<i>262</i>	<i>576</i>	<i>1,300</i>
<i>Spring 2013 Total</i>	<i>388</i>	<i>78</i>	<i>117</i>	<i>582</i>	<i>131</i>	<i>183</i>	<i>318</i>	<i>632</i>	<i>1,214</i>
<i>Spring 2011 Total</i>				<i>678</i>				<i>632</i>	<i>1,310</i>
2019 vs. 2017	(4)	(3)	(4)	(11)	0	0	0	0	(11)
2019 vs. 2015	28	(29)	(44)	(45)	(96)	(125)	(177)	(398)	(443)
2019 vs. 2013	57	17	24	97	(96)	(125)	(233)	(454)	(357)
2019 vs. 2011				1				(454)	(453)

Acres Released Since Spring 2017	8
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Acres Issued Since Spring 2017	6
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Footnotes:

- | | | | |
|-----|---|-----|---|
| (1) | Client provided data, Pending Phase 1 Release | (5) | Client provided data, Pending Phase 1 Release |
| (2) | Client provided data, Pending Phase 2 Release | (6) | Client provided data, Pending Phase 2 Release |
| (3) | Client provided data, Pending Phase 3 Release | (7) | Client provided data, Pending Phase 3 Release |
| (4) | Sum of Col (1) through Col (3) | (8) | Sum of Col (5) through Col (7) |
| | | (9) | Col (4) + Col (8) |

Spring 2017, 2015, 2013 and 2011 Amounts from the Spring 2017, 2015, 2013 and 2011 Reports by Pinnacle

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
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Exhibit 7.6a									
Permits Counts by Mine Status and Year of Issuance - Total									
Issue Year	Active				Final Map				Total
	Phase 1	Phase 2	Phase 3	Total	Phase 1	Phase 2	Phase 3	Total	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1982	0	0	1	1	0	0	0	0	1
1983	5	0	0	5	2	0	0	2	7
1984	7	0	0	7	2	0	0	2	9
1985	1	0	0	1	1	0	0	1	2
1986	0	0	0	0	0	0	0	0	0
1987	3	0	0	3	1	0	0	1	4
1988	1	1	0	2	0	0	0	0	2
1989	2	0	0	2	0	0	0	0	2
1990	0	0	0	0	0	0	0	0	0
1991	1	0	0	1	0	0	0	0	1
1992	1	1	1	3	1	0	0	1	4
1993	0	2	0	2	0	0	0	0	2
1994	2	1	1	4	0	0	0	0	4
1995	1	1	0	2	0	1	0	1	3
1996	1	0	0	1	0	2	0	2	3
1997	0	0	0	0	0	0	0	0	0
1998	2	0	0	2	3	1	0	4	6
1999	0	1	0	1	0	0	1	1	2
2000	0	0	0	0	1	1	0	2	2
2001	1	0	0	1	0	0	0	0	1
2002	0	0	0	0	0	1	0	1	1
2003	1	1	0	2	1	0	0	1	3
2004	4	0	0	4	1	0	1	2	6
2005	1	1	0	2	0	1	0	1	3
2006	5	0	0	5	2	2	0	4	9
2007	4	2	0	6	1	1	1	3	9
2008	1	0	0	1	2	3	1	6	7
2009	2	0	0	2	1	2	0	3	5
2010	1	0	0	1	0	2	0	2	3
2011	1	2	0	3	2	4	0	6	9
2012	3	0	0	3	3	3	1	7	10
2013	5	0	0	5	2	0	0	2	7
2014	8	0	0	8	0	0	0	0	8
2015	6	0	0	6	0	0	0	0	6
2016	4	0	0	4	0	0	0	0	4
2017	1	0	0	1	0	0	0	0	1
2018	3	0	0	3	0	0	0	0	3
Total	78	13	3	94	26	24	5	55	149
<i>Spring 2017 Total</i>	<i>84</i>	<i>13</i>	<i>3</i>	<i>100</i>	<i>23</i>	<i>33</i>	<i>12</i>	<i>68</i>	<i>168</i>
<i>Spring 2015 Total</i>	<i>99</i>	<i>26</i>	<i>5</i>	<i>130</i>	<i>11</i>	<i>19</i>	<i>28</i>	<i>58</i>	<i>188</i>
<i>Spring 2013 Total</i>	<i>110</i>	<i>9</i>	<i>6</i>	<i>125</i>	<i>36</i>	<i>34</i>	<i>30</i>	<i>100</i>	<i>225</i>
<i>Spring 2011 Total</i>				<i>127</i>				<i>111</i>	<i>238</i>
2019 vs. 2017	(6)	0	0	(6)	3	(9)	(7)	(13)	(19)
2019 vs. 2015	(21)	(13)	(2)	(36)	15	5	(23)	(3)	(39)
2019 vs. 2013	(32)	4	(3)	(31)	(10)	(10)	(25)	(45)	(76)
2019 vs. 2011				(33)				(56)	(89)

Permits Released Since Spring 2017	24
Total PSE of Permits Released Since Spring 2017	7,213,000
Net Adjusted PSE of Permits Released Since Spring 2017	5,137,313

Permits Issued Since Spring 2017	5
Total PSE of Permits Issued Since Spring 2017	6,761,000
Net Adjusted PSE of Permits Issued Since Spring 2017	6,265,500

Permits remaining in system from Spring 2017 to Spring 2019	144
Total PSE change of permits remaining in system from Spring 2017 to Spring 2019	2,793,000
Net Adjusted PSE change of permits remaining in system from Spring 2017 to Spring 2019	3,749,500

Footnotes:

- | | |
|--|--|
| (1) Sum of Exhibits 7.3a through 7.5a Col (1), Pending Release | (5) Sum of Exhibits 7.3a through 7.5a Col (5), Pending Release |
| (2) Sum of Exhibits 7.3a through 7.5a Col (2), Pending Release | (6) Sum of Exhibits 7.3a through 7.5a Col (6), Pending Release |
| (3) Sum of Exhibits 7.3a through 7.5a Col (3), Pending Release | (7) Sum of Exhibits 7.3a through 7.5a Col (7), Pending Release |
| (4) Sum of Col (1) through Col (3) | (8) Sum of Col (5) through Col (7) |
| | (9) Col (4) + Col (8) |

Spring 2017, 2015, 2013 and 2011 Amounts from the Spring 2017, 2015, 2013 and 2011 Reports by Pinnacle

**OHIO RECLAMATION FORFEITURE FUND ANALYSIS
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Exhibit 7.6b									
Implied Bonded Acres by Mine Status and Year of Issuance - Total									
Issue Year	Active				Final Map				Total
	Phase 1	Phase 2	Phase 3	Total	Phase 1	Phase 2	Phase 3	Total	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1982	0	0	4	4	0	0	0	0	4
1983	159	26	38	223	35	58	85	178	401
1984	222	58	83	364	437	771	1,102	2,311	2,674
1985	0	31	45	76	8	204	291	502	579
1986	0	0	0	0	0	0	0	0	0
1987	44	0	0	44	49	109	156	314	359
1988	0	31	47	78	0	0	0	0	78
1989	17	0	0	17	0	0	0	0	17
1990	0	0	0	0	0	0	0	0	0
1991	35	0	0	35	0	0	0	0	35
1992	3	123	217	343	13	19	91	124	467
1993	0	12	27	40	0	0	0	0	40
1994	13	78	299	389	0	0	0	0	389
1995	30	147	210	388	0	76	174	251	638
1996	32	0	0	32	0	341	564	905	937
1997	0	0	0	0	0	0	0	0	0
1998	44	18	25	86	161	476	854	1,491	1,577
1999	0	3	60	62	0	0	101	101	163
2000	0	0	0	0	4	34	58	96	96
2001	24	123	176	323	0	0	0	0	323
2002	0	0	0	0	0	31	44	74	74
2003	24	9	13	46	16	366	523	905	952
2004	133	138	226	497	10	13	235	258	755
2005	28	46	144	219	0	12	173	185	403
2006	234	373	660	1,267	95	651	964	1,709	2,976
2007	316	486	1,064	1,865	33	278	910	1,221	3,086
2008	114	322	608	1,044	51	780	1,702	2,534	3,577
2009	162	54	131	348	0	351	532	883	1,230
2010	9	13	18	40	0	118	169	287	327
2011	6	268	383	657	241	810	1,157	2,208	2,864
2012	78	38	134	250	63	359	628	1,051	1,301
2013	290	0	0	290	59	83	118	260	550
2014	357	68	98	523	0	0	0	0	523
2015	24	0	0	24	0	0	0	0	24
2016	16	0	0	16	0	0	0	0	16
2017	13	0	0	13	0	0	0	0	13
2018	12	0	0	12	0	0	0	0	12
Total	2,437	2,467	4,710	9,614	1,277	5,941	10,629	17,846	27,460
<i>Spring 2017 Total</i>	<i>3,064</i>	<i>3,867</i>	<i>6,803</i>	<i>13,734</i>	<i>961</i>	<i>5,427</i>	<i>11,136</i>	<i>17,525</i>	<i>31,259</i>
<i>Spring 2015 Total</i>	<i>3,439</i>	<i>7,096</i>	<i>12,427</i>	<i>22,962</i>	<i>853</i>	<i>3,446</i>	<i>10,035</i>	<i>14,334</i>	<i>37,295</i>
<i>Spring 2013 Total</i>	<i>4,923</i>	<i>6,041</i>	<i>10,486</i>	<i>21,449</i>	<i>2,337</i>	<i>8,063</i>	<i>17,380</i>	<i>27,780</i>	<i>49,229</i>
<i>Spring 2011 Total</i>				<i>19,729</i>				<i>29,091</i>	<i>48,820</i>
2019 vs. 2017	(627)	(1,400)	(2,093)	(4,120)	315	514	(507)	321	(3,798)
2019 vs. 2015	(1,001)	(4,629)	(7,717)	(13,348)	424	2,495	593	3,512	(9,835)
2019 vs. 2013	(2,486)	(3,574)	(5,775)	(11,835)	(1,060)	(2,123)	(6,751)	(9,934)	(21,769)
2019 vs. 2011				(10,115)				(11,245)	(21,360)

Acres Released Since Spring 2017	3,680
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Acres Issued Since Spring 2017	30
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Footnotes:

- | | |
|--|--|
| (1) Sum of Exhibits 7.3b through 7.5b Col (1), Pending Release | (5) Sum of Exhibits 7.3b through 7.5b Col (5), Pending Release |
| (2) Sum of Exhibits 7.3b through 7.5b Col (2), Pending Release | (6) Sum of Exhibits 7.3b through 7.5b Col (6), Pending Release |
| (3) Sum of Exhibits 7.3b through 7.5b Col (3), Pending Release | (7) Sum of Exhibits 7.3b through 7.5b Col (7), Pending Release |
| (4) Sum of Col (1) through Col (3) | (8) Sum of Col (5) through Col (7) |
| | (9) Col (4) + Col (8) |

Spring 2017, 2015, 2013 and 2011 Amounts from the Spring 2017, 2015, 2013 and 2011 Reports by Pinnacle

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
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Exhibit 8 Projected Investment Rates Based on US Treasury Returns in Spring 2019				
Calendar Year	Investment Return (%)	Yearly Discount Factor		Compound Discount Factor
	(1)	(2)		(3)
2019	2.560%	97.504%		-1.256%
2020	2.520%	97.542%		-3.683%
2021	2.500%	97.561%		-6.032%
2022	2.500%	97.561%		-8.324%
2023	2.500%	97.561%		-10.560%
2024	2.550%	97.513%		-12.784%
2025	2.590%	97.475%		-14.986%
2026	2.630%	97.437%		-17.165%
2027	2.660%	97.409%		-19.311%
2028	2.700%	97.371%		-21.432%
2029	2.720%	97.352%		-23.513%
2030	2.740%	97.333%		-25.553%
2031	2.750%	97.324%		-27.545%
2032	2.770%	97.305%		-29.498%
2033	2.790%	97.286%		-31.412%
2034	2.810%	97.267%		-33.286%
2035	2.830%	97.248%		-35.122%
2036	2.840%	97.238%		-36.914%
2037	2.860%	97.220%		-38.668%
2038	2.880%	97.201%		-40.385%
2039	2.900%	97.182%		-42.065%
2040	2.910%	97.172%		-43.703%
2041	2.930%	97.153%		-45.306%
2042	2.940%	97.144%		-46.868%
2043	2.960%	97.125%		-48.395%
2044	2.970%	97.116%		-49.884%
2045	2.990%	97.097%		-51.339%
2046	3.000%	97.087%		-52.756%
2047	3.020%	97.069%		-54.141%
2048	3.030%	97.059%		-55.490%

Footnotes:

- (1) Based on US Treasury Returns in Spring 2019; Returns not in **Bold** are interpolated from US Treasury Rates
- (2), (3) Based on Col (1)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
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Exhibit 9.1 Water Reclamation Cost					
		Surface	Underground	Other	Total
Acres	(1) Permitted acres with water treatment	0	1,633	0	1,633
	(2) Permitted acres with water monitoring	0	0	395	395
	(3) Percent of monitored permits that become water treatment	5.00%	5.00%	5.00%	
	(4) Projected permitted acres with water treatment	0	1,633	20	1,653
Average Cost	(5) Water capital Ohio permit #433 avg cost per <i>affected</i> acre		13.36		
	(6) Water treatment Ohio permit #433 avg cost per <i>affected</i> acre		318.36		
	(7) Water capital West Virginia avg cost per permitted acre	12.44	58.32	45.28	
	(8) Water treatment West Virginia avg cost per permitted acre	5.66	201.78	150.26	
Selected Average Cost	(9) Water capital selected avg cost per permitted acre	12.44	58.32	45.28	
	(10) Water treatment selected avg cost per permitted acre	5.66	201.78	150.26	
Number of Exposure Years	(11) Number of years for water capital reclamation	75	75	75	
	(12) Number of years for water treatment reclamation	75	75	75	
Forfeiture Rate	(13) Selected water forfeiture rate	0.50%	0.50%	0.50%	
Estimate 1 Gross Reclamation Cost	(14) Water capital reclamation cost	0	35,720	335	36,056
	(15) Water treatment reclamation cost	0	123,578	1,113	124,691
	(16) Estimate 1 - Total gross water reclamation cost	0	159,298	1,449	160,747
Estimate 2 Gross Reclamation Cost	(17) Estimated water treatment cost for Ohio permit #201501				1,842,842
	(18) Number of Ohio permits in the fund with water treatment and monitoring				5
	(19) Number of Ohio full cost permits with water treatment				1
	(20) Total number of Ohio permits in the fund (Active + Final Map)				149
	(21) Ratio of water issue permits to total permits				4.03%
	(22) Selected ratio of water issue permits to total permits				5.00%
	(23) Estimate 2 - Total gross water reclamation cost				92,142
Estimate 3 Gross Reclamation Cost	(24a) Pinnacle's 2013 Ohio analysis selected gross water reclamation cost				2,500,000
	(24b) Pinnacle's 2015 Ohio analysis selected gross water reclamation cost				2,250,000
	(24c) Pinnacle's 2017 Ohio analysis selected gross water reclamation cost				500,000
	(25) Selected gross water reclamation cost				500,000
Net Reclamation Cost	(26) Water Trust Fund mitigation adjustment percentage				10%
	(27) Total estimated net water reclamation cost				450,000

Footnotes:

- (1), (2) Provided by Client
- (3) Judgmental Selection (The two permits being monitored have a minimal probability of developing into long term water treatment)
- (4) Row (1) + Row (2) x Row (3)
- (5), (6) From 2015 Pinnacle Report
- (7), (8) Internal Analysis of West Virginia Data, treatment costs adjusted for pre 2011 NPDES standards
- (9) Row (7)
- (10) Row (8)
- (11), (12) Based on Client estimates.
- (13) Judgmental Selection. Equals the selected land reclamation forfeiture rate in Exhibit 5.2 Row (10)
- (14) Row (4) x Row (9) x Row (11) x Row (13)
- (15) Row (4) x Row (10) x Row (12) x Row (13)
- (16) Row (14) + Row (15)
- (17) Client provided data
- (18) Exhibit 9.2a and Exhibit 9.2b
- (19) Client provided data
- (20) Exhibit 7.6a Col (9)
- (21) [Row (18) + Row (19)] / Row(20)
- (22) Judgmental Selection based on Row (21)
- (23) Row (17) x Row (22)
- (24) Selection from the Prior Ohio analysis (2013 Pinnacle Report, 2015 Pinnacle Report, and 2017 Pinnacle Report)
- (25) Selection based on Row (16), Row (23), and Row (24)
- (26) Judgmental Selection, considering forfeitures before Trust is set up or while Trust is partially funded by the RFF.
- (27) Row (25) x [1.00 - Row (26)]

**OHIO RECLAMATION FORFEITURE FUND ANALYSIS
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Exhibit 9.2a Water Reclamation Cost				
Ohio Permits with Water Treatment				
		Surface	Underground	Other
Permit # 354 Issue Yr. 1984 Underground	Water Capital Cost per Year		N/A	
	Water Treatment Cost per Year		N/A	
	Permitted Acres		997	
	Affected Acres			
	Implied Bonded Acres		1,796	
	Total PSE		77,000,000	
	Net Adjusted PSE		75,014,625	
Permit # 355 Issue Yr. 1984 Underground	Water Capital Cost per Year		N/A	
	Water Treatment Cost per Year		N/A	
	Permitted Acres		317	
	Affected Acres			
	Implied Bonded Acres		514	
	Total PSE		478,000	
	Net Adjusted PSE		0	
Permit # 463 Issue Yr. 1985 Underground	Water Capital Cost per Year		N/A	
	Water Treatment Cost per Year		N/A	
	Permitted Acres		319	
	Affected Acres			
	Implied Bonded Acres		502	
	Total PSE		1,335,000	
	Net Adjusted PSE		952,125	

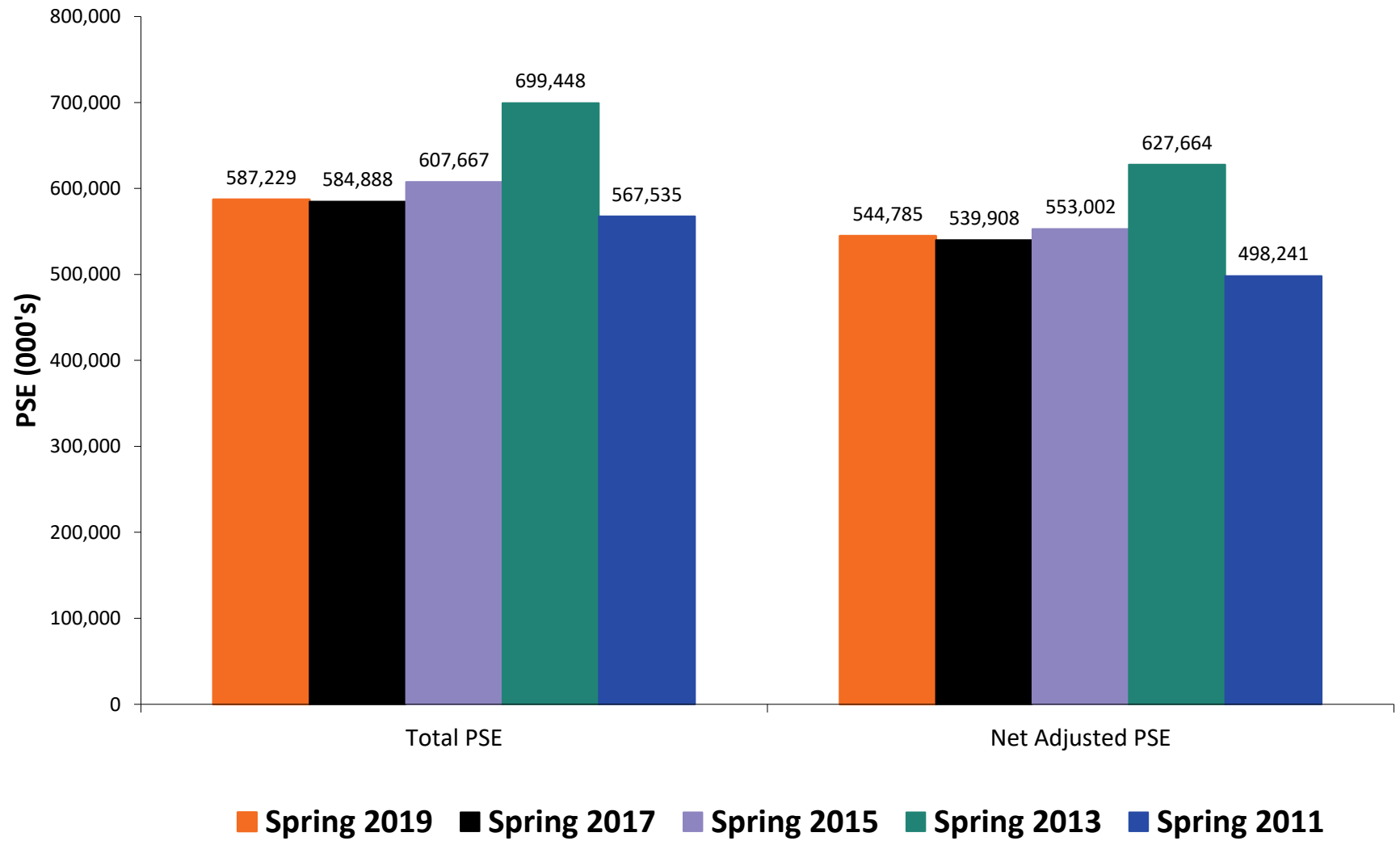
Data provided by Client

**OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2019**

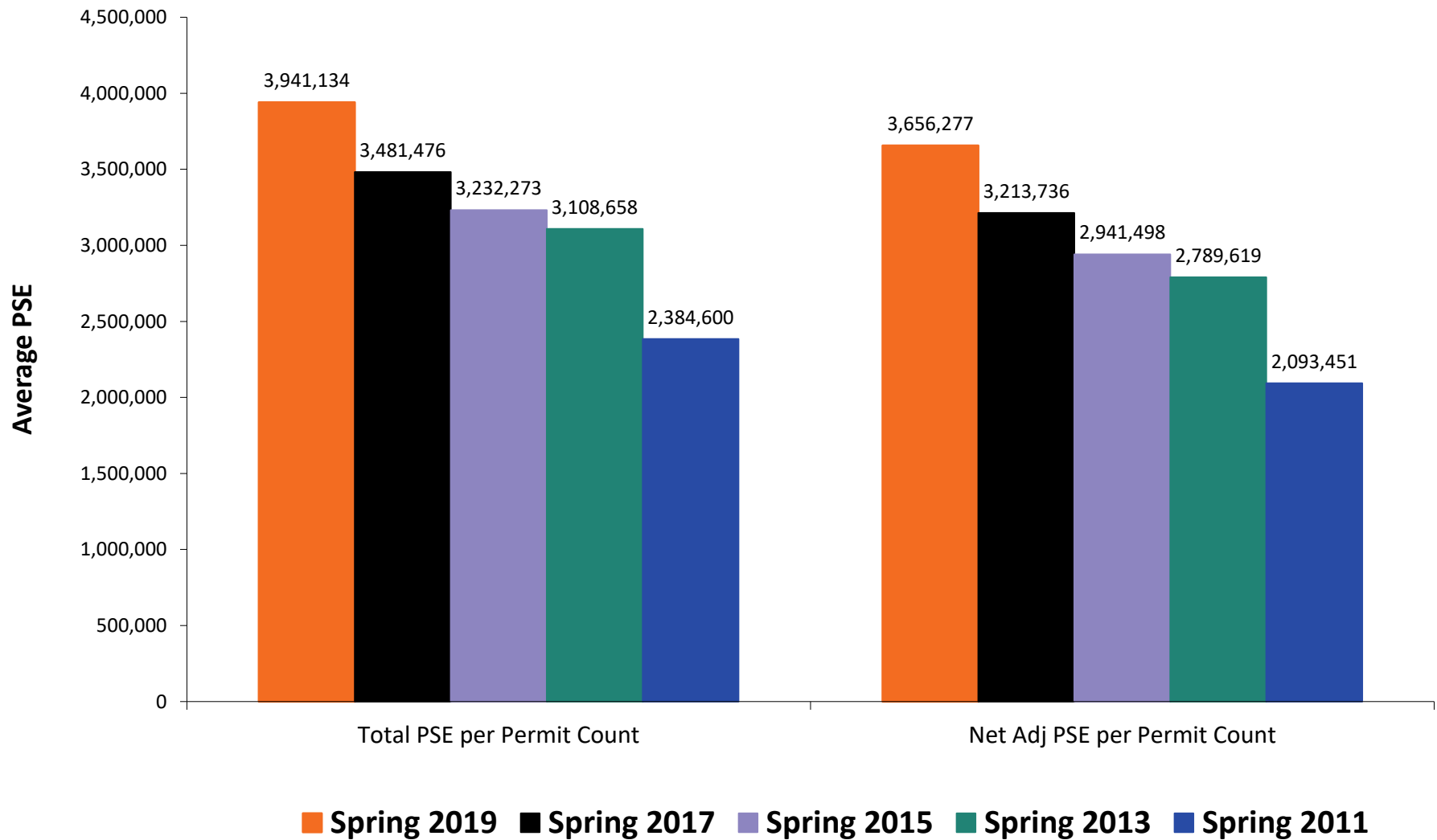
Exhibit 9.2b Water Reclamation Cost				
Ohio Permits Being Monitored For Possible Water Treatment				
		Surface	Underground	Other
Permit #	Permitted Acres			344
215	Affected Acres			
Issue Yr.	Implied Bonded Acres			99
1983	Total PSE			280,000
Facility Operations	Net Adjusted PSE			167,500
Permit #	Permitted Acres			52
223	Affected Acres			
Issue Yr.	Implied Bonded Acres			79
1983	Total PSE			274,000
Facility Operations	Net Adjusted PSE			194,788

Data provided by client.

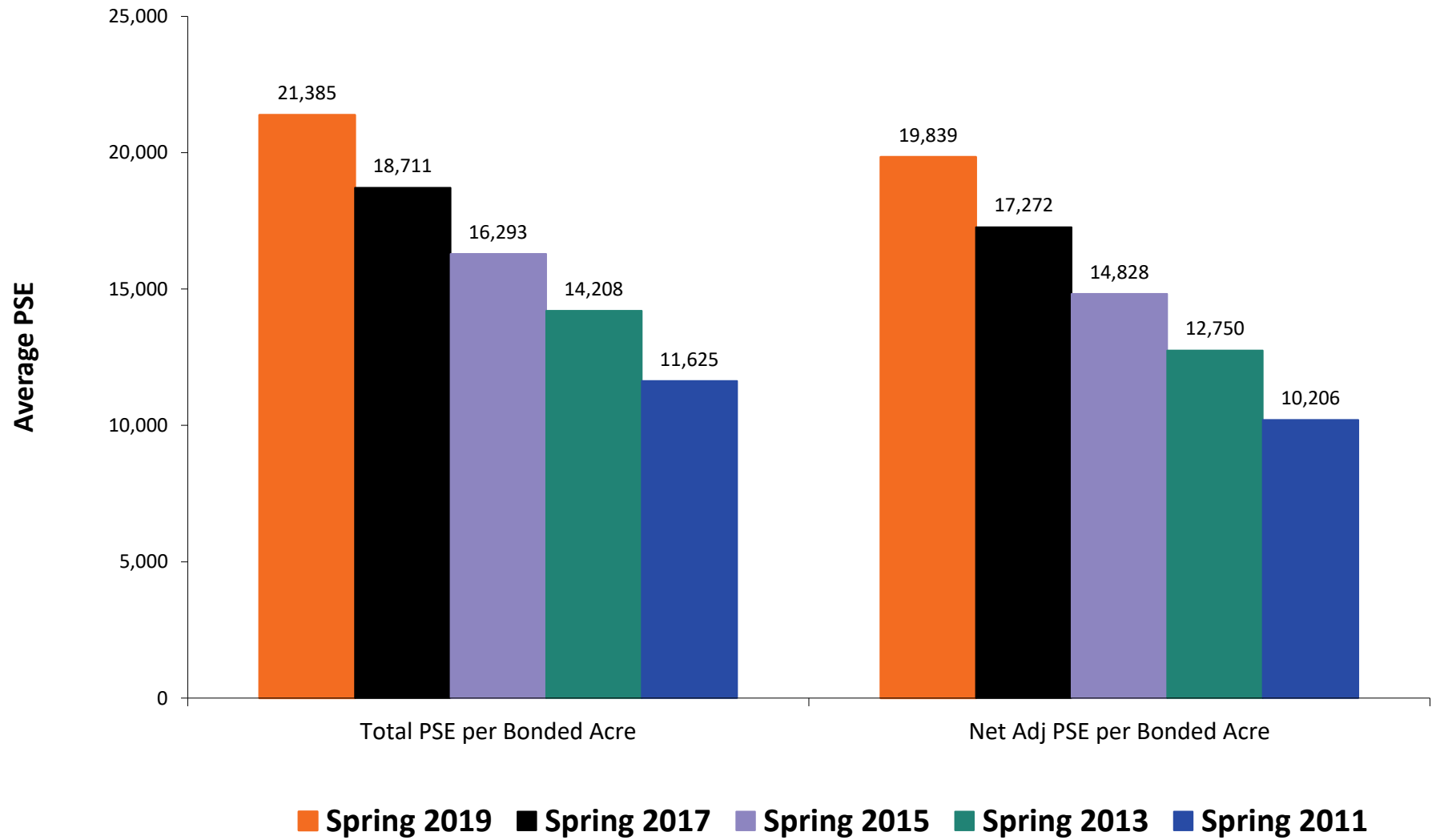
PSE Comparison



Average PSE Per Permit Count Comparison



Average PSE Per Bonded Acre Comparison



OHIO RECLAMATION FORFEITURE FUND ANALYSIS

SPRING 2019

Exhibit 1						
Cash Flow						
(all figures discounted to present value)						
Calendar Year	Tonnage Fee	Interest Income	Land Reclamation	Water Reclamation	Operating Expense	Fund Balance
	(1)	(2)	(3)	(4)	(5)	(6)
2018						22,224,988
2019	1,091,000	575,603	2,221,592	0	35,000	21,635,000
2020	947,000	536,614	722,328	0	35,000	22,361,286
2021	787,000	534,554	0	0	35,000	23,647,839
2022	801,000	551,163	1,241,795	5,750	45,000	23,707,457
2023	800,000	539,042	1,250,878	5,792	45,000	23,744,829
2024	765,000	536,592	1,282,524	5,846	45,000	23,713,051
2025	375,500	526,262	1,221,144	5,912	45,000	23,342,758
2026	0	508,538	1,237,445	5,991	45,000	22,562,861
2027	0	484,273	1,253,597	6,069	45,000	21,742,468
2028	0	461,229	952,234	6,146	45,000	21,200,318
2029	0	441,063	495,902	6,222	45,000	21,094,257
2030	0	430,293	353,364	6,299	45,000	21,119,887
2031	0	420,816	307,423	6,375	45,000	21,181,905
2032	0	413,662	311,102	6,451	45,000	21,233,014
2033	0	406,318	314,764	6,527	45,000	21,273,041
2034	0	398,796	318,407	6,603	45,000	21,301,827
2035	0	391,110	106,295	6,678	45,000	21,534,963
2036	0	385,830	47,053	6,753	45,000	21,821,986
2037	0	382,778	47,575	6,828	45,000	22,105,360
2038	0	379,530	48,093	6,903	45,000	22,384,895
2039	0	376,091	39,075	6,976	45,000	22,669,935
2040	0	371,386	39,489	7,050	45,000	22,949,782
2041	0	367,779	39,899	7,124	45,000	23,225,538
2042	0	362,802	40,310	7,197	45,000	23,495,833
2043	0	358,898	0	7,270	10,000	23,837,461
2044	0	354,808	0	7,342	10,000	24,174,927
2045	0	351,738	0	7,414	10,000	24,509,251
2046	0	347,373	0	7,486	10,000	24,839,137
2047	0	344,007	0	7,558	10,000	25,165,587
2048	0	339,398	0	7,629	10,000	25,487,356
2049	0	334,392	0	7,718	10,000	25,804,031
2050	0	328,591	0	7,791	10,000	26,114,831
2051	0	322,769	0	7,864	10,000	26,419,735
2052	0	316,934	0	7,938	10,000	26,718,731
2053	0	311,095	0	8,013	10,000	27,011,813
2054	0	305,258	0	8,088	10,000	27,298,982
2055	0	299,430	0	8,165	10,000	27,580,248
2056	0	293,619	0	8,241	10,000	27,855,626
2057	0	287,829	0	8,319	10,000	28,125,136
2058	0	282,067	0	8,397	10,000	28,388,806
2059	0	276,339	0	8,476	10,000	28,646,669
2060	0	270,648	0	8,556	10,000	28,898,761
2061	0	265,000	0	8,637	10,000	29,145,124
2062	0	259,400	0	8,718	10,000	29,385,806
2063	0	253,850	0	8,800	10,000	29,620,856
2064	0	248,355	0	8,883	10,000	29,850,328
2065	0	242,919	0	8,967	10,000	30,074,281
2066	0	237,544	0	9,051	10,000	30,292,774
2067	0	232,233	0	9,136	10,000	30,505,871
2068	0	226,989	0	9,222	10,000	30,713,637
2069	0	221,814	0	9,309	10,000	30,916,142
2070	0	216,710	0	9,397	10,000	31,113,456
2071	0	211,679	0	9,485	10,000	31,305,650
2072	0	206,723	0	9,574	10,000	31,492,799

OHIO RECLAMATION FORFEITURE FUND ANALYSIS

SPRING 2019

Exhibit 1 Cash Flow (all figures discounted to present value)						
Calendar Year	Tonnage Fee (1)	Interest Income (2)	Land Reclamation (3)	Water Reclamation (4)	Operating Expense (5)	Fund Balance (6)
2073	0	201,843	0	9,665	10,000	31,674,977
2074	0	197,040	0	9,756	10,000	31,852,262
2075	0	192,316	0	9,847	10,000	32,024,731
2076	0	187,671	0	9,940	10,000	32,192,462
2077	0	183,106	0	10,034	10,000	32,355,534
2078	0	178,621	0	10,128	10,000	32,514,027
2079	0	174,217	0	10,224	10,000	32,668,021
2080	0	169,895	0	10,320	10,000	32,817,596
2081	0	165,653	0	10,417	10,000	32,962,832
2082	0	161,493	0	10,515	10,000	33,103,810
2083	0	157,414	0	10,614	10,000	33,240,610
2084	0	153,416	0	10,714	10,000	33,373,312
2085	0	149,499	0	10,815	10,000	33,501,996
2086	0	145,662	0	10,917	10,000	33,626,741
2087	0	141,904	0	11,019	10,000	33,747,626
2088	0	138,226	0	11,123	10,000	33,864,729
2089	0	134,627	0	11,228	10,000	33,978,128
2090	0	131,105	0	11,334	10,000	34,087,900
2091	0	127,660	0	11,440	10,000	34,194,120
2092	0	124,292	0	11,548	10,000	34,296,864
2093	0	120,999	0	11,657	10,000	34,396,207
2094	0	117,781	0	11,766	10,000	34,492,221
2095	0	114,636	0	11,877	10,000	34,584,981
2096	0	111,564	0	11,989	10,000	34,674,556
Total	5,566,500	23,011,179	13,892,288	645,823	1,590,000	

Tonnage Fee	
Fund Balance	Rate
< \$5M	0.16
\$5M - \$10M	0.14
> \$10M	0.12

Footnotes:

- All columns shown at present value, based on Exhibit 8, Investment Rates
- (1) Based on coal production from the Ohio Department of Natural Resources, Division of Geological Survey. Future production based on the report "Annual Energy Outlook 2019 with projections to 2050" by the Energy Information Administration. The per ton fee is predicated upon the prior year Fund Balance in column (6) according to the chart at the bottom of the second page, titled Tonnage Fee.
- (2) Active mining continues for seven years, with the seventh year coal production being half the prior year. See Exhibit 3.1.
- (3) [Prior year Col (6) x Exhibit 8 Col (1)] + [Col (1) / 2 x Exhibit 8 Col (1)] x (1 + Exhibit 8 Col (3)). Years 2048 and subsequent based on 3.030% discount factor
- (4) Exhibit 2.1 Col (2).
- (5) Exhibit 2.1 Col (4).
- (5) Based on discussion with client. Inflation and discount rates assumed to offset.
- Majority of expense for land reclamation, based on 15% load in PSEs. Others include:
- | | | | | | |
|----------|---------|-----------------|----------|-----------------|----------|
| Overhead | \$5,000 | Actuarial/2 yrs | \$60,000 | Water Treatment | \$10,000 |
|----------|---------|-----------------|----------|-----------------|----------|
- (6) Year 2018 client provided data. Subsequent years = prior year col (6) + Col (1) + Col (2) - Col (3) - Col (4) - Col (5)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS

SPRING 2019

Exhibit 2.1							
Total Expenditures							
Calendar Year	Land Reclamation		Water Reclamation		Operating Expense	Gross Total	Net Total
	Gross (1)	Net (2)	Gross (3)	Net (4)			
2018							
2019	2,221,592	2,221,592	0	0	35,000	2,256,592	2,256,592
2020	722,328	722,328	0	0	35,000	757,328	757,328
2021	0	0	0	0	35,000	35,000	35,000
2022	1,332,670	1,241,795	6,389	5,750	45,000	1,384,058	1,292,545
2023	1,342,526	1,250,878	6,436	5,792	45,000	1,393,962	1,301,670
2024	1,376,475	1,282,524	6,495	5,846	45,000	1,427,970	1,333,370
2025	1,310,698	1,221,144	6,569	5,912	45,000	1,362,267	1,272,056
2026	1,328,194	1,237,445	6,656	5,991	45,000	1,379,851	1,288,435
2027	1,345,531	1,253,597	6,743	6,069	45,000	1,397,274	1,304,666
2028	1,012,635	952,234	6,828	6,146	45,000	1,064,464	1,003,380
2029	531,183	495,902	6,914	6,222	45,000	583,096	547,124
2030	376,557	353,364	6,998	6,299	45,000	428,555	404,662
2031	327,284	307,423	7,084	6,375	45,000	379,367	358,798
2032	331,201	311,102	7,168	6,451	45,000	383,369	362,553
2033	335,100	314,764	7,253	6,527	45,000	387,352	366,292
2034	338,978	318,407	7,337	6,603	45,000	391,315	370,010
2035	115,179	106,295	7,420	6,678	45,000	167,599	157,973
2036	49,808	47,053	7,504	6,753	45,000	102,311	98,807
2037	50,360	47,575	7,587	6,828	45,000	102,947	99,403
2038	50,908	48,093	7,670	6,903	45,000	103,577	99,995
2039	41,234	39,075	7,752	6,976	45,000	93,986	91,051
2040	41,671	39,489	7,834	7,050	45,000	94,505	91,539
2041	42,104	39,899	7,915	7,124	45,000	95,019	92,023
2042	42,538	40,310	7,997	7,197	45,000	95,534	92,507
2043	0	0	8,077	7,270	10,000	18,077	17,270
2044	0	0	8,158	7,342	10,000	18,158	17,342
2045	0	0	8,238	7,414	10,000	18,238	17,414
2046	0	0	8,318	7,486	10,000	18,318	17,486
2047	0	0	8,397	7,558	10,000	18,397	17,558
2048	0	0	8,476	7,629	10,000	18,476	17,629
2049	0	0	8,576	7,718	10,000	18,576	17,718
2050	0	0	8,656	7,791	10,000	18,656	17,791
2051	0	0	8,738	7,864	10,000	18,738	17,864
2052	0	0	8,820	7,938	10,000	18,820	17,938
2053	0	0	8,903	8,013	10,000	18,903	18,013
2054	0	0	8,987	8,088	10,000	18,987	18,088
2055	0	0	9,072	8,165	10,000	19,072	18,165
2056	0	0	9,157	8,241	10,000	19,157	18,241
2057	0	0	9,243	8,319	10,000	19,243	18,319
2058	0	0	9,330	8,397	10,000	19,330	18,397
2059	0	0	9,418	8,476	10,000	19,418	18,476
2060	0	0	9,507	8,556	10,000	19,507	18,556
2061	0	0	9,596	8,637	10,000	19,596	18,637
2062	0	0	9,687	8,718	10,000	19,687	18,718
2063	0	0	9,778	8,800	10,000	19,778	18,800
2064	0	0	9,870	8,883	10,000	19,870	18,883
2065	0	0	9,963	8,967	10,000	19,963	18,967
2066	0	0	10,057	9,051	10,000	20,057	19,051
2067	0	0	10,151	9,136	10,000	20,151	19,136
2068	0	0	10,247	9,222	10,000	20,247	19,222
2069	0	0	10,343	9,309	10,000	20,343	19,309
2070	0	0	10,441	9,397	10,000	20,441	19,397
2071	0	0	10,539	9,485	10,000	20,539	19,485
2072	0	0	10,638	9,574	10,000	20,638	19,574



OHIO RECLAMATION FORFEITURE FUND ANALYSIS

SPRING 2019

Exhibit 2.1							
Total Expenditures							
Calendar Year	Land Reclamation		Water Reclamation		Operating Expense	Gross Total	Net Total
	Gross (1)	Net (2)	Gross (3)	Net (4)			
2073	0	0	10,738	9,665	10,000	20,738	19,665
2074	0	0	10,840	9,756	10,000	20,840	19,756
2075	0	0	10,942	9,847	10,000	20,942	19,847
2076	0	0	11,045	9,940	10,000	21,045	19,940
2077	0	0	11,149	10,034	10,000	21,149	20,034
2078	0	0	11,254	10,128	10,000	21,254	20,128
2079	0	0	11,359	10,224	10,000	21,359	20,224
2080	0	0	11,466	10,320	10,000	21,466	20,320
2081	0	0	11,574	10,417	10,000	21,574	20,417
2082	0	0	11,683	10,515	10,000	21,683	20,515
2083	0	0	11,793	10,614	10,000	21,793	20,614
2084	0	0	11,904	10,714	10,000	21,904	20,714
2085	0	0	12,016	10,815	10,000	22,016	20,815
2086	0	0	12,130	10,917	10,000	22,130	20,917
2087	0	0	12,244	11,019	10,000	22,244	21,019
2088	0	0	12,359	11,123	10,000	22,359	21,123
2089	0	0	12,475	11,228	10,000	22,475	21,228
2090	0	0	12,593	11,334	10,000	22,593	21,334
2091	0	0	12,711	11,440	10,000	22,711	21,440
2092	0	0	12,831	11,548	10,000	22,831	21,548
2093	0	0	12,952	11,657	10,000	22,952	21,657
2094	0	0	13,074	11,766	10,000	23,074	21,766
2095	0	0	13,197	11,877	10,000	23,197	21,877
2096	0	0	13,321	11,989	10,000	23,321	21,989
Total	14,666,752	13,892,288	717,581	645,823	1,590,000	16,974,333	16,128,111

Footnotes:

- (1) Exhibit 2.2 Col (3). Inflated and discounted reclamation costs.
 (2) Exhibit 2.2 Col (6). Inflated and discounted reclamation costs.
 (3) Exhibit 2.3 Col (3). Inflated and discounted reclamation costs.
 (4) Exhibit 2.3 Col (6). Inflated and discounted reclamation costs.

- (5) Client provided data
 (6) Col (1) + Col (3) + Col (5)
 (7) Col (2) + Col (4) + Col (5)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2019

Exhibit 2.2						
Land Reclamation Expenditures						
Calendar Year	Gross			Net		
	Expenditure	Inflated	Discounted	Expenditure	Inflated	Discounted
	(1)	(2)	(3)	(4)	(5)	(6)
2018						
2019	2,249,849	2,249,849	2,221,592	2,249,849	2,249,849	2,221,592
2020	749,950	749,950	722,328	749,950	749,950	722,328
2021	0	0	0	0	0	0
2022	1,390,631	1,453,677	1,332,670	1,295,804	1,354,551	1,241,795
2023	1,390,745	1,501,039	1,342,526	1,295,804	1,398,570	1,250,878
2024	1,412,825	1,578,241	1,376,475	1,316,393	1,470,518	1,282,524
2025	1,330,273	1,541,745	1,310,698	1,239,381	1,436,404	1,221,144
2026	1,330,273	1,603,415	1,328,194	1,239,381	1,493,861	1,237,445
2027	1,330,273	1,667,551	1,345,531	1,239,381	1,553,615	1,253,597
2028	988,638	1,288,869	1,012,635	929,668	1,211,992	952,234
2029	512,212	694,472	531,183	478,191	648,345	495,902
2030	358,709	505,803	376,557	336,615	474,649	353,364
2031	308,024	451,707	327,284	289,332	424,295	307,423
2032	308,024	469,775	331,201	289,332	441,267	311,102
2033	308,024	488,566	335,100	289,332	458,918	314,764
2034	308,024	508,109	338,978	289,332	477,274	318,407
2035	103,484	177,532	115,179	95,502	163,840	106,295
2036	44,251	78,952	49,808	41,804	74,586	47,053
2037	44,251	82,110	50,360	41,804	77,570	47,575
2038	44,251	85,394	50,908	41,804	80,672	48,093
2039	35,463	71,173	41,234	33,606	67,446	39,075
2040	35,463	74,020	41,671	33,606	70,144	39,489
2041	35,463	76,981	42,104	33,606	72,950	39,899
2042	35,463	80,060	42,538	33,606	75,868	40,310
2043	0	0	0	0	0	0
2044	0	0	0	0	0	0
Total	14,654,563	17,478,991	14,666,752	13,883,085	16,527,133	13,892,288

Footnotes:

- | | |
|--|---|
| <p>(1) See report for details.
 Years 2019-2021 reflect current reclamation projects.
 Payments for future forfeitures delayed by three years to reflect period between forfeiture order and reclamation activity.</p> <p>(2) Col (1) x annual inflation of
 0.0% for years 2019-20
 3.0% for years 2021-22
 3.5% for years 2023-24
 4.0% for years 2025 & Subs</p> <p>(3) Col (2) + Col (2) x Exhibit 8 Col (3)</p> | <p>(4) See report for details
 Years 2019-2021 reflect current reclamation projects.
 Payments for future forfeitures delayed by three years to reflect period between forfeiture order and reclamation activity.</p> <p>(5) Col (4) x annual inflation of
 0.0% for years 2019-20
 3.0% for years 2021-22
 3.5% for years 2023-24
 4.0% for years 2025 & Subs</p> <p>(6) Col (5) + Col (5) x Exhibit 8 Col (3)</p> |
|--|---|

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2019

Exhibit 5.1 Forfeiture Rates	
Years Since Issuance	All Permit Types (1)
1	0.00%
2	0.00%
3	0.33%
4	0.33%
5	0.33%
6	0.33%
7	0.33%
8	0.33%
9	0.33%
10	0.33%
11	0.33%
12	0.33%
13	0.33%
14	0.33%
15	0.33%
16	0.33%
17	0.33%
18	0.33%
19	0.33%
20	0.33%
21	0.33%

Footnotes:

(1)

Exhibit 5.2 Row (10)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2019

Exhibit 5.2 Forfeiture Rate Calculation			
Evaluation Year Ending 6/30/XXXX	Number of Permits		Forfeiture Rate
	In Force	Forfeited	
	(1)	(2)	(3)
1993	799	6	0.75%
1994	775	16	2.06%
1995	722	1	0.14%
1996	683	29	4.25%
1997	579	4	0.69%
1998	568	5	0.88%
1999	563	2	0.36%
2000	456	17	3.73%
2001	389	2	0.51%
2002	363	3	0.83%
2003	357	3	0.84%
2004	356	2	0.56%
2005	338	8	2.37%
2006	329	0	0.00%
2007	321	0	0.00%
2008	308	0	0.00%
2009	290	0	0.00%
2010	266	0	0.00%
2011	252	0	0.00%
2012	246	0	0.00%
2013	229	0	0.00%
2014	224	0	0.00%
2015	220	6	2.73%
2016	209	0	0.00%
2017	194	0	0.00%
2018	181	0	0.00%
Total	10,217	104	1.02%
(4a) Average lifetime of permit			21.00
(4b) Selected average lifetime of permits w/o forfeitures			19.00
(5) Ohio indicated forfeiture annual incremental rate			0.05%
(6) Kentucky forfeiture annual incremental rate			1.43%
(7) West Virginia forfeiture annual incremental rate			1.02%
(8) Weighted factor			0.86
(9) Weighted indicated forfeiture annual incremental rate			0.61%
(10) Ohio selected forfeiture annual incremental rate			0.33%

Footnotes:

- (1) Office of Surface Mining Reclamation and Enforcement annual evaluation reports of all mine sites in Ohio
- (2) Client data
- (3) Col (2) / Col (1)
- (4a) Exhibit 3.1
- (4b) Selected average lifetime based on assumption of minimal forfeitures within the first two years of issuance
- (5) Col (3) / Row (4b)
- (6) From Pinnacle analysis of Kentucky data applied to Ohio permit count by mine type distribution
- (7) From Pinnacle analysis of West Virginia data applied to Ohio permit count by mine type distribution
- (8) Exhibit 5.3 Col (4)
- (9) [Weighted average of rows (5) through (7)] / row (8) based on...
OH = 60.0%, KY = 20.0% and WV = 20.0%
- (10) Selected based on rows (5), (6), (7), and (9)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS

SPRING 2019

Exhibit 1						
Cash Flow						
(all figures discounted to present value)						
Calendar Year	Tonnage Fee	Interest Income	Land Reclamation	Water Reclamation	Operating Expense	Fund Balance
	(1)	(2)	(3)	(4)	(5)	(6)
2018						22,224,988
2019	1,091,000	575,603	2,221,592	0	35,000	21,635,000
2020	947,000	536,614	722,328	0	35,000	22,361,286
2021	787,000	534,554	0	0	35,000	23,647,839
2022	801,000	551,163	2,483,590	5,750	45,000	22,465,662
2023	800,000	511,275	2,501,756	5,792	45,000	21,224,389
2024	765,000	480,538	2,565,049	5,846	45,000	19,854,033
2025	375,500	441,292	2,442,288	5,912	45,000	18,177,626
2026	0	396,012	2,474,890	5,991	45,000	16,047,758
2027	0	344,438	2,507,194	6,069	45,000	13,833,933
2028	0	293,463	1,904,468	6,146	45,000	12,171,782
2029	0	253,228	991,803	6,222	45,000	11,381,985
2030	0	232,176	706,727	6,299	45,000	10,856,135
2031	0	216,310	614,845	6,375	45,000	10,406,224
2032	0	203,224	622,204	6,451	45,000	9,935,792
2033	0	190,133	629,528	6,527	45,000	9,444,869
2034	0	177,059	636,815	6,603	45,000	8,933,510
2035	0	164,023	212,591	6,678	45,000	8,833,264
2036	0	158,261	94,107	6,753	45,000	8,845,664
2037	0	155,161	95,150	6,828	45,000	8,853,847
2038	0	152,013	96,186	6,903	45,000	8,857,772
2039	0	148,821	78,150	6,976	45,000	8,876,466
2040	0	145,417	78,978	7,050	45,000	8,890,856
2041	0	142,479	79,799	7,124	45,000	8,901,413
2042	0	139,047	80,620	7,197	45,000	8,907,643
2043	0	136,064	0	7,270	10,000	9,026,437
2044	0	134,354	0	7,342	10,000	9,143,449
2045	0	133,034	0	7,414	10,000	9,259,069
2046	0	131,230	0	7,486	10,000	9,372,812
2047	0	129,808	0	7,558	10,000	9,485,063
2048	0	127,921	0	7,629	10,000	9,595,355
2049	0	125,890	0	7,718	10,000	9,703,527
2050	0	123,566	0	7,791	10,000	9,809,302
2051	0	121,239	0	7,864	10,000	9,912,677
2052	0	118,914	0	7,938	10,000	10,013,652
2053	0	116,592	0	8,013	10,000	10,112,232
2054	0	114,277	0	8,088	10,000	10,208,421
2055	0	111,972	0	8,165	10,000	10,302,228
2056	0	109,677	0	8,241	10,000	10,393,664
2057	0	107,397	0	8,319	10,000	10,482,741
2058	0	105,132	0	8,397	10,000	10,569,476
2059	0	102,884	0	8,476	10,000	10,653,883
2060	0	100,656	0	8,556	10,000	10,735,983
2061	0	98,448	0	8,637	10,000	10,815,795
2062	0	96,264	0	8,718	10,000	10,893,340
2063	0	94,102	0	8,800	10,000	10,968,643
2064	0	91,966	0	8,883	10,000	11,041,726
2065	0	89,856	0	8,967	10,000	11,112,616
2066	0	87,774	0	9,051	10,000	11,181,339
2067	0	85,719	0	9,136	10,000	11,247,922
2068	0	83,694	0	9,222	10,000	11,312,394
2069	0	81,698	0	9,309	10,000	11,374,783
2070	0	79,733	0	9,397	10,000	11,435,119
2071	0	77,798	0	9,485	10,000	11,493,432
2072	0	75,896	0	9,574	10,000	11,549,753

OHIO RECLAMATION FORFEITURE FUND ANALYSIS

SPRING 2019

Exhibit 1 Cash Flow (all figures discounted to present value)						
Calendar Year	Tonnage Fee (1)	Interest Income (2)	Land Reclamation (3)	Water Reclamation (4)	Operating Expense (5)	Fund Balance (6)
2073	0	74,025	0	9,665	10,000	11,604,113
2074	0	72,186	0	9,756	10,000	11,656,543
2075	0	70,379	0	9,847	10,000	11,707,075
2076	0	68,606	0	9,940	10,000	11,755,741
2077	0	66,865	0	10,034	10,000	11,802,572
2078	0	65,157	0	10,128	10,000	11,847,601
2079	0	63,482	0	10,224	10,000	11,890,859
2080	0	61,840	0	10,320	10,000	11,932,380
2081	0	60,231	0	10,417	10,000	11,972,194
2082	0	58,655	0	10,515	10,000	12,010,333
2083	0	57,111	0	10,614	10,000	12,046,831
2084	0	55,600	0	10,714	10,000	12,081,717
2085	0	54,121	0	10,815	10,000	12,115,023
2086	0	52,674	0	10,917	10,000	12,146,781
2087	0	51,259	0	11,019	10,000	12,177,020
2088	0	49,876	0	11,123	10,000	12,205,773
2089	0	48,523	0	11,228	10,000	12,233,068
2090	0	47,201	0	11,334	10,000	12,258,936
2091	0	45,910	0	11,440	10,000	12,283,406
2092	0	44,649	0	11,548	10,000	12,306,507
2093	0	43,417	0	11,657	10,000	12,328,268
2094	0	42,215	0	11,766	10,000	12,348,716
2095	0	41,042	0	11,877	10,000	12,367,880
2096	0	39,896	0	11,989	10,000	12,385,788
Total	5,566,500	11,670,779	24,840,657	645,823	1,590,000	

Tonnage Fee	
Fund Balance	Rate
< \$5M	0.16
\$5M - \$10M	0.14
> \$10M	0.12

Footnotes:

All columns shown at present value, based on Exhibit 8, Investment Rates

- (1) Based on coal production from the Ohio Department of Natural Resources, Division of Geological Survey.
Future production based on the report "Annual Energy Outlook 2019 with projections to 2050" by the Energy Information Administration
The per ton fee is predicated upon the prior year Fund Balance in column (6) according to the chart at the bottom of the second page, titled Tonnage Fee.
- (2) Active mining continues for seven years, with the seventh year coal production being half the prior year. See Exhibit 3.1.
[Prior year Col (6) x Exhibit 8 Col (1)] + [Col (1) / 2 x Exhibit 8 Col (1)] x (1 + Exhibit 8 Col (3)). Years 2048 and subsequent based on 3.030% discount factor
- (3) Exhibit 2.1 Col (2).
- (4) Exhibit 2.1 Col (4).
- (5) Based on discussion with client. Inflation and discount rates assumed to offset.
Majority of expense for land reclamation, based on 15% load in PSEs. Others include:
- | | | | | | |
|----------|---------|-----------------|----------|-----------------|----------|
| Overhead | \$5,000 | Actuarial/2 yrs | \$60,000 | Water Treatment | \$10,000 |
|----------|---------|-----------------|----------|-----------------|----------|
- (6) Year 2018 client provided data. Subsequent years = prior year col (6) + Col (1) + Col (2) - Col (3) - Col (4) - Col (5)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS

SPRING 2019

Exhibit 2.1							
Total Expenditures							
Calendar Year	Land Reclamation		Water Reclamation		Operating Expense	Gross Total	Net Total
	Gross (1)	Net (2)	Gross (3)	Net (4)			
2018							
2019	2,221,592	2,221,592	0	0	35,000	2,256,592	2,256,592
2020	722,328	722,328	0	0	35,000	757,328	757,328
2021	0	0	0	0	35,000	35,000	35,000
2022	2,665,339	2,483,590	6,389	5,750	45,000	2,716,728	2,534,340
2023	2,685,053	2,501,756	6,436	5,792	45,000	2,736,488	2,552,548
2024	2,752,950	2,565,049	6,495	5,846	45,000	2,804,445	2,615,894
2025	2,621,396	2,442,288	6,569	5,912	45,000	2,672,964	2,493,199
2026	2,656,389	2,474,890	6,656	5,991	45,000	2,708,045	2,525,880
2027	2,691,062	2,507,194	6,743	6,069	45,000	2,742,805	2,558,263
2028	2,025,270	1,904,468	6,828	6,146	45,000	2,077,099	1,955,614
2029	1,062,366	991,803	6,914	6,222	45,000	1,114,279	1,043,026
2030	753,114	706,727	6,998	6,299	45,000	805,112	758,026
2031	654,568	614,845	7,084	6,375	45,000	706,651	666,220
2032	662,402	622,204	7,168	6,451	45,000	714,570	673,655
2033	670,199	629,528	7,253	6,527	45,000	722,452	681,056
2034	677,957	636,815	7,337	6,603	45,000	730,293	688,418
2035	230,358	212,591	7,420	6,678	45,000	282,778	264,269
2036	99,615	94,107	7,504	6,753	45,000	152,119	145,860
2037	100,719	95,150	7,587	6,828	45,000	153,306	146,978
2038	101,816	96,186	7,670	6,903	45,000	154,485	148,088
2039	82,468	78,150	7,752	6,976	45,000	135,220	130,126
2040	83,342	78,978	7,834	7,050	45,000	136,176	131,028
2041	84,208	79,799	7,915	7,124	45,000	137,123	131,922
2042	85,075	80,620	7,997	7,197	45,000	138,072	132,817
2043	0	0	8,077	7,270	10,000	18,077	17,270
2044	0	0	8,158	7,342	10,000	18,158	17,342
2045	0	0	8,238	7,414	10,000	18,238	17,414
2046	0	0	8,318	7,486	10,000	18,318	17,486
2047	0	0	8,397	7,558	10,000	18,397	17,558
2048	0	0	8,476	7,629	10,000	18,476	17,629
2049	0	0	8,576	7,718	10,000	18,576	17,718
2050	0	0	8,656	7,791	10,000	18,656	17,791
2051	0	0	8,738	7,864	10,000	18,738	17,864
2052	0	0	8,820	7,938	10,000	18,820	17,938
2053	0	0	8,903	8,013	10,000	18,903	18,013
2054	0	0	8,987	8,088	10,000	18,987	18,088
2055	0	0	9,072	8,165	10,000	19,072	18,165
2056	0	0	9,157	8,241	10,000	19,157	18,241
2057	0	0	9,243	8,319	10,000	19,243	18,319
2058	0	0	9,330	8,397	10,000	19,330	18,397
2059	0	0	9,418	8,476	10,000	19,418	18,476
2060	0	0	9,507	8,556	10,000	19,507	18,556
2061	0	0	9,596	8,637	10,000	19,596	18,637
2062	0	0	9,687	8,718	10,000	19,687	18,718
2063	0	0	9,778	8,800	10,000	19,778	18,800
2064	0	0	9,870	8,883	10,000	19,870	18,883
2065	0	0	9,963	8,967	10,000	19,963	18,967
2066	0	0	10,057	9,051	10,000	20,057	19,051
2067	0	0	10,151	9,136	10,000	20,151	19,136
2068	0	0	10,247	9,222	10,000	20,247	19,222
2069	0	0	10,343	9,309	10,000	20,343	19,309
2070	0	0	10,441	9,397	10,000	20,441	19,397
2071	0	0	10,539	9,485	10,000	20,539	19,485
2072	0	0	10,638	9,574	10,000	20,638	19,574

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2019

Exhibit 2.1							
Total Expenditures							
Calendar Year	Land Reclamation		Water Reclamation		Operating Expense	Gross Total	Net Total
	Gross (1)	Net (2)	Gross (3)	Net (4)			
2073	0	0	10,738	9,665	10,000	20,738	19,665
2074	0	0	10,840	9,756	10,000	20,840	19,756
2075	0	0	10,942	9,847	10,000	20,942	19,847
2076	0	0	11,045	9,940	10,000	21,045	19,940
2077	0	0	11,149	10,034	10,000	21,149	20,034
2078	0	0	11,254	10,128	10,000	21,254	20,128
2079	0	0	11,359	10,224	10,000	21,359	20,224
2080	0	0	11,466	10,320	10,000	21,466	20,320
2081	0	0	11,574	10,417	10,000	21,574	20,417
2082	0	0	11,683	10,515	10,000	21,683	20,515
2083	0	0	11,793	10,614	10,000	21,793	20,614
2084	0	0	11,904	10,714	10,000	21,904	20,714
2085	0	0	12,016	10,815	10,000	22,016	20,815
2086	0	0	12,130	10,917	10,000	22,130	20,917
2087	0	0	12,244	11,019	10,000	22,244	21,019
2088	0	0	12,359	11,123	10,000	22,359	21,123
2089	0	0	12,475	11,228	10,000	22,475	21,228
2090	0	0	12,593	11,334	10,000	22,593	21,334
2091	0	0	12,711	11,440	10,000	22,711	21,440
2092	0	0	12,831	11,548	10,000	22,831	21,548
2093	0	0	12,952	11,657	10,000	22,952	21,657
2094	0	0	13,074	11,766	10,000	23,074	21,766
2095	0	0	13,197	11,877	10,000	23,197	21,877
2096	0	0	13,321	11,989	10,000	23,321	21,989
Total	26,389,585	24,840,657	717,581	645,823	1,590,000	28,697,166	27,076,479

Footnotes:

- (1) Exhibit 2.2 Col (3). Inflated and discounted reclamation costs.
 (2) Exhibit 2.2 Col (6). Inflated and discounted reclamation costs.
 (3) Exhibit 2.3 Col (3). Inflated and discounted reclamation costs.
 (4) Exhibit 2.3 Col (6). Inflated and discounted reclamation costs.

- (5) Client provided data
 (6) Col (1) + Col (3) + Col (5)
 (7) Col (2) + Col (4) + Col (5)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2019

Exhibit 2.2						
Land Reclamation Expenditures						
Calendar Year	Gross			Net		
	Expenditure	Inflated	Discounted	Expenditure	Inflated	Discounted
	(1)	(2)	(3)	(4)	(5)	(6)
2018						
2019	2,249,849	2,249,849	2,221,592	2,249,849	2,249,849	2,221,592
2020	749,950	749,950	722,328	749,950	749,950	722,328
2021	0	0	0	0	0	0
2022	2,781,262	2,907,353	2,665,339	2,591,609	2,709,102	2,483,590
2023	2,781,489	3,002,078	2,685,053	2,591,609	2,797,139	2,501,756
2024	2,825,649	3,156,481	2,752,950	2,632,786	2,941,037	2,565,049
2025	2,660,546	3,083,490	2,621,396	2,478,762	2,872,809	2,442,288
2026	2,660,546	3,206,829	2,656,389	2,478,762	2,987,721	2,474,890
2027	2,660,546	3,335,103	2,691,062	2,478,762	3,107,230	2,507,194
2028	1,977,275	2,577,739	2,025,270	1,859,336	2,423,984	1,904,468
2029	1,024,424	1,388,945	1,062,366	956,382	1,296,691	991,803
2030	717,419	1,011,606	753,114	673,231	949,298	706,727
2031	616,049	903,414	654,568	578,664	848,591	614,845
2032	616,049	939,551	662,402	578,664	882,534	622,204
2033	616,049	977,133	670,199	578,664	917,836	629,528
2034	616,049	1,016,218	677,957	578,664	954,549	636,815
2035	206,968	355,065	230,358	191,005	327,679	212,591
2036	88,502	157,904	99,615	83,608	149,172	94,107
2037	88,502	164,220	100,719	83,608	155,139	95,150
2038	88,502	170,788	101,816	83,608	161,345	96,186
2039	70,927	142,347	82,468	67,212	134,893	78,150
2040	70,927	148,040	83,342	67,212	140,288	78,978
2041	70,927	153,962	84,208	67,212	145,900	79,799
2042	70,927	160,121	85,075	67,212	151,736	80,620
2043	0	0	0	0	0	0
2044	0	0	0	0	0	0
Total	26,309,327	31,958,183	26,389,585	24,766,371	30,054,469	24,840,657

Footnotes:

(1)	See report for details. Years 2019-2021 reflect current reclamation projects. Payments for future forfeitures delayed by three years to reflect period between forfeiture order and reclamation activity.	(4)	See report for details Years 2019-2021 reflect current reclamation projects. Payments for future forfeitures delayed by three years to reflect period between forfeiture order and reclamation activity.
(2)	Col (1) x annual inflation of 0.0% for years 2019-20 3.0% for years 2021-22 3.5% for years 2023-24 4.0% for years 2025 & Subs	(5)	Col (4) x annual inflation of 0.0% for years 2019-20 3.0% for years 2021-22 3.5% for years 2023-24 4.0% for years 2025 & Subs
(3)	Col (2) + Col (2) x Exhibit 8 Col (3)	(6)	Col (5) + Col (5) x Exhibit 8 Col (3)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
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Exhibit 5.1 Forfeiture Rates	
Years Since Issuance	All Permit Types (1)
1	0.00%
2	0.00%
3	0.67%
4	0.67%
5	0.67%
6	0.67%
7	0.67%
8	0.67%
9	0.67%
10	0.67%
11	0.67%
12	0.67%
13	0.67%
14	0.67%
15	0.67%
16	0.67%
17	0.67%
18	0.67%
19	0.67%
20	0.67%
21	0.67%

Footnotes:

(1)

Exhibit 5.2 Row (10)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
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Exhibit 5.2 Forfeiture Rate Calculation			
Evaluation Year Ending 6/30/XXXX	Number of Permits		Forfeiture Rate
	In Force	Forfeited	
	(1)	(2)	(3)
1993	799	6	0.75%
1994	775	16	2.06%
1995	722	1	0.14%
1996	683	29	4.25%
1997	579	4	0.69%
1998	568	5	0.88%
1999	563	2	0.36%
2000	456	17	3.73%
2001	389	2	0.51%
2002	363	3	0.83%
2003	357	3	0.84%
2004	356	2	0.56%
2005	338	8	2.37%
2006	329	0	0.00%
2007	321	0	0.00%
2008	308	0	0.00%
2009	290	0	0.00%
2010	266	0	0.00%
2011	252	0	0.00%
2012	246	0	0.00%
2013	229	0	0.00%
2014	224	0	0.00%
2015	220	6	2.73%
2016	209	0	0.00%
2017	194	0	0.00%
2018	181	0	0.00%
Total	10,217	104	1.02%
(4a) Average lifetime of permit			21.00
(4b) Selected average lifetime of permits w/o forfeitures			19.00
(5) Ohio indicated forfeiture annual incremental rate			0.05%
(6) Kentucky forfeiture annual incremental rate			1.43%
(7) West Virginia forfeiture annual incremental rate			1.02%
(8) Weighted factor			0.86
(9) Weighted indicated forfeiture annual incremental rate			0.61%
(10) Ohio selected forfeiture annual incremental rate			0.67%

Footnotes:

- (1) Office of Surface Mining Reclamation and Enforcement annual evaluation reports of all mine sites in Ohio
- (2) Client data
- (3) Col (2) / Col (1)
- (4a) Exhibit 3.1
- (4b) Selected average lifetime based on assumption of minimal forfeitures within the first two years of issuance
- (5) Col (3) / Row (4b)
- (6) From Pinnacle analysis of Kentucky data applied to Ohio permit count by mine type distribution
- (7) From Pinnacle analysis of West Virginia data applied to Ohio permit count by mine type distribution
- (8) Exhibit 5.3 Col (4)
- (9) [Weighted average of rows (5) through (7)] / row (8) based on...
OH = 60.0%, KY = 20.0% and WV = 20.0%
- (10) Selected based on rows (5), (6), (7), and (9)